# The Foundry


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# What

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# The Foundry Editorial

## Preparedness Program Needs Private Industry

AN EXCELLENT demonstration of the desire for peace on the part of the peoples of all countries is contained in the following quotation from Vincent Delport's report of the International foundry congress held in Warsaw, Poland, during the height of the recent European war crisis:

> It is a striking fact that, notwithstanding the presence of representatives from countries directly affected by the crisis in central Europe and Germany, the meeting was held in an atmosphere of good fellowship and mutual consideration for one another's feelings, and not a single word was said, either publicly or in private, that could lead to heated discussions or acute controversy.
>
> It was said on more than one occasion, and from opposite sides, that if political negotiations were conducted between peoples and statesmen with the same restraint as was evident at the congress, the path of nations would be much smoother than it is. Here is a valuable feature to be placed to the credit of international technical and scientific meetings, among which foundry meetings play a conspicuous part.

Foundrymen of the world should take great pride in this record.

---

Changes in world conditions place new problems before the United States, if the overwhelming desire for peace on the part of the American people is to be fulfilled. Military and civilian experts agree preparedness is the first essential for protection in the world as it is today.

Preparedness means not only the possession of ships, arms and other materials of war, but as Walter Lippman points out, "American preparedness must now take the form of making actually available a capacity to produce great armaments." Private industry must have the equipment, methods and skill to meet military demands at any time.

The government is to build a large foundry building at the Mare Island navy yard for the production of gray iron, and perhaps later steel castings. In line with a sound policy of preparedness, the government should purchase its castings needs from the foundries in the district, thereby permitting the foundry industry to gain at first hand the knowledge necessary to meet military needs.

A protest against building this new foundry already has been made to the navy department. Others should follow.

---

## Act As An Industry

BEFORE an industry committee is established to recommend wage schedules for the foundry industry in connection with the Fair Labor Standards act, two points should be considered.

For maximum efficiency, it is believed by many that all four branches of the foundry industry should combine under one committee. Since numerous companies operate one or more of the four divisions of the foundry industry, the idea of conflicting arrangements in one plant, as in NRA days, is intolerable.

The foundry industry should not be included in some broad classification such as iron and steel. Because the foundry industry differs radically from the steel industry in production methods and geographical location it seems improbable that adequate representation can be secured through a very broad classification.

Leaders in all branches should take steps now to prepare a policy which will present a united front when the time for action arrives.

---

## Telling the Youngsters

PROGRESS continues in disseminating data on improvements constantly being made in properties of all classes of castings. Latest contribution is the program arranged by the St. Louis chapter of A.F.A. and presented to the student body of the Missouri School of Mines and Metallurgy during the recent Rolla conference.

While a number of students generally attend various sessions of regional conference programs staged in co-operation with engineering schools, the session at Rolla was probably the first program directed entirely toward the student body. Two excellent talks surely provided the young engineers with a much better conception of properties and applications of castings.

Frank G. Steinebach
Editor

# System

MECHANICAL equipment recently installed in the plant of the Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., has introduced order, system and neatness into the casting cleaning room, a department which as all foundrymen know does not lend itself any too readily to any hygienic or uplift program. The formerly congested bottle neck, frequently a brake on production activities, potential accident hazard and in many instances a source of anxiety and irritation to supervisory and clerical force, now functions as smoothly and efficiently as any other department of the extensive plant. In addition to other advantages, and this really is the actual touchstone, the basic factor on which all improvement is predicated, it is claimed that the new system has reduced operating cost of the department.

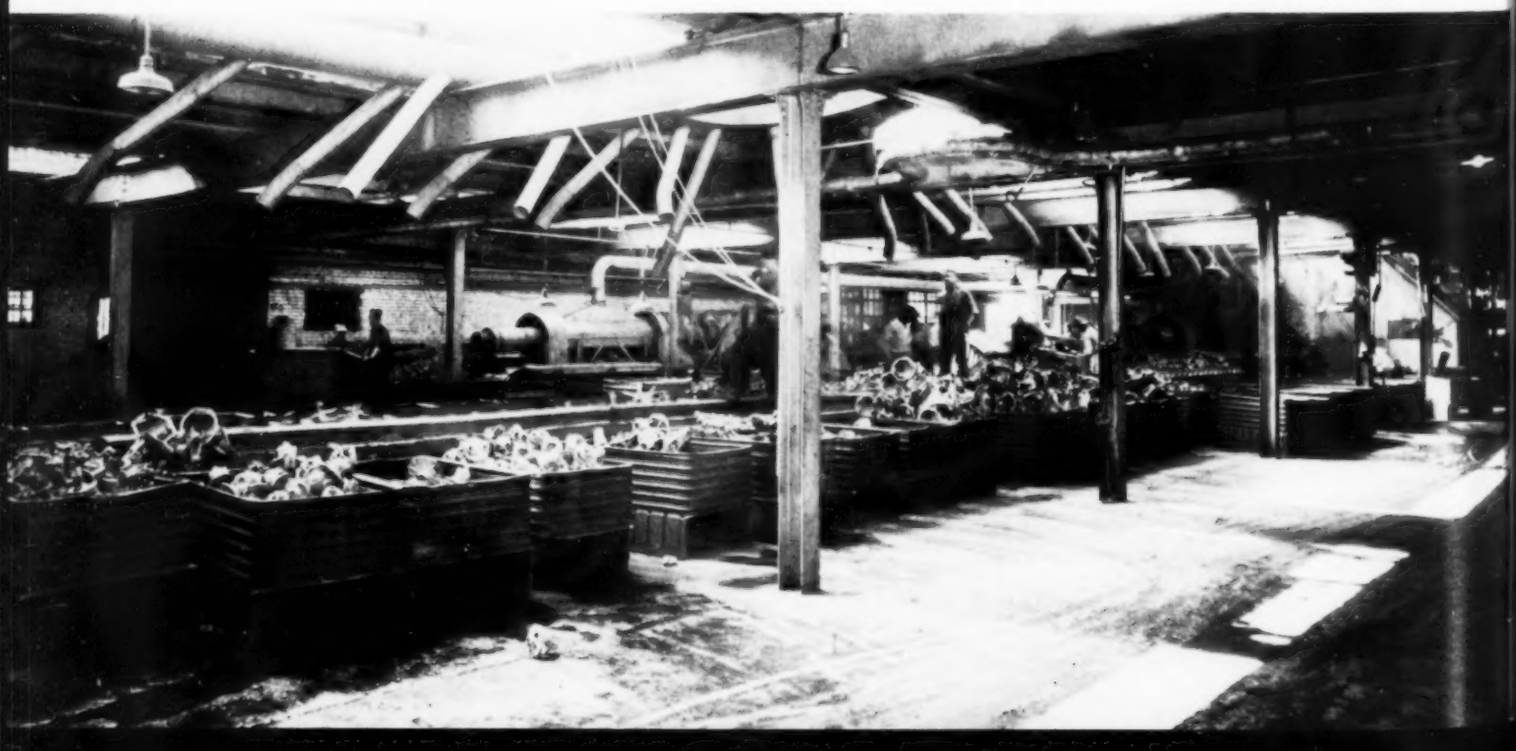
### Produce Wide Variety of Castings

Castings produced in the foundry daily include approximately 600 different varieties and these are made in quantities ranging from a few items to several thousand. Some are for immediate shipment, while others may have to be held and allowed to accumulate for a considerable period. Some are tumbled while others are cleaned under streams of metal abrasives. Practically all require more or less attention in the hands of the grinders. Gate stumps and other extraneous projections are removed under snubbers and shears. Rigid inspection that begins at the shakeout follows each casting through every stage up to the final operation where it is tested by gage or die in a punch press for accuracy of shape and dimensions. Manifestly to coordinate and synchronize all these various factors and in addition to eliminate all the usual cleaning room dirt, constituted a rather sizable problem.

Solution of the problem was found in the erection of two parallel platforms 30 feet apart on center lines, 10 feet above the floor level and 160 feet in length, extending the full width of the building with the exception of space for a wide gangway at either end. A moving belt above each platform carries all the castings past a number of operators. Each man picks out certain designated castings, knocks off annealing test lugs and then throws the castings into steel bins on either side of the platform. The larger castings are removed from the belt on the first platform. The smaller castings are transferred to a short belt at the end and thence to the long belt on the second platform which moves in the opposite direction to the first belt. Here the process is repeated with a number of operators removing the castings and throwing them into bins alongside. Briefly, the castings travel over a rectangular course from which they are removed in regular sequence and distributed to the proper bins until none remains on the belt.

The foregoing refers to the soft iron castings, that is the malleable iron castings after they have been annealed. Method of handling the castings before they reach this stage present many points of interest since nearly all the work is done by mechanical equipment. Castings are molded, poured and shaken out in one building. They are broken from the sprues, receive a preliminary inspection and are loaded into tote boxes in a second building. In a third building the castings are annealed in one section, passed over the device referred to in the preceding paragraph and then tumbled,

**Fig. 1—Long line of steel containers loaded with hard iron castings obscures all but the upper outline of the conveyor immediately beyond**



By PAT DWYER

# Reduces Time and Labor

Fig. 2—Castings are cleaned by abrasive blasting, and the department is kept neat and orderly in conformance with good housekeeping

blasted, inspected and passed through the die department, and finally through the shipping department. Daily reports from each section keep the office in close touch with the progress of any casting or any batch of castings and therefore facilitate both the laying out of the daily program, and the introduction of minor or major changes in the program to meet unexpected demands.

Hot castings from the various shakeout stations in the foundry are loaded into metal baskets suspended from a monorail. This conveyor discharges the castings on to a long steel plate conveyor extending practically the entire length of the building and running at a height of approximately 2 feet above the floor level. Several attendants on either side knock the castings free from gates and risers. The castings are picked up and thrown into tote boxes. The scrap remains on the conveyor which runs up an incline and discharges the scrap into a tumbling barrel where all adhering sand is removed. The cleaned scrap is taken either directly to the furnaces or to stock piles in the yard. Clean scrap is considered a necessary essential in the production of clean castings held to rigid chemical and physical specifications.

In the illustration Fig. 1 the long line of steel containers loaded with hard iron castings occupies the center and therefore obscures all but the upper outline of the conveyor immediately beyond. The containers mounted on skids are picked up by lift truck and moved a short distance to the continuous type tumbling barrels shown at the right end and back ground. Only small castings are put through the hard iron milling operation. This is for the purpose of inspection and breaking of sprues and risers. Large castings are not cleaned in the hard iron state. After the small castings leave the tumbling barrels they are again moved by truck to the vicinity of the annealing ovens in an adjoining building and loaded into the annealing pots.

In this connection it is interesting to note that no packing material is used in the pots. The pots are filled with castings and stacked on the cars which move continuously through a tunnel type kiln or furnace. Thus when a loaded car enters one end, a similar car emerges from the opposite end. Operation of this type of oven has been described in former issues of THE FOUNDRY.

Another and later type of furnace also is in operation where the castings are not packed into pots, but are loaded openly on a conveyor unit which carries them through the furnace according to a predetermined time cycle of varying temperatures. The method is known as a bright annealing method, based on the fact that the usual flame is not present. Heating is accomplished by radiant tubes and therefore there is no oxidation of the casting surface. Gas for heating the furnace passes through a number of radiant tubes and raises the temperature in the furnace to the required degree in the various areas. Details of the process lie outside the scope of the present description concerned specifically with the handling and distribution of the castings after they leave the annealing furnaces.

The soft iron castings are dumped on a rubber belt which carries them up an incline as shown in Fig. 4 and discharges them on to the first of the long rubber belts referred to in paragraph three of the present description. Sorters, stationed at the top of the incline pick out any castings carrying gate stumps. These castings are thrown into a row of five hoppers shown at the right. Operators below take the castings from the hoppers and remove the excrescences in a battery of shears and snubbers.

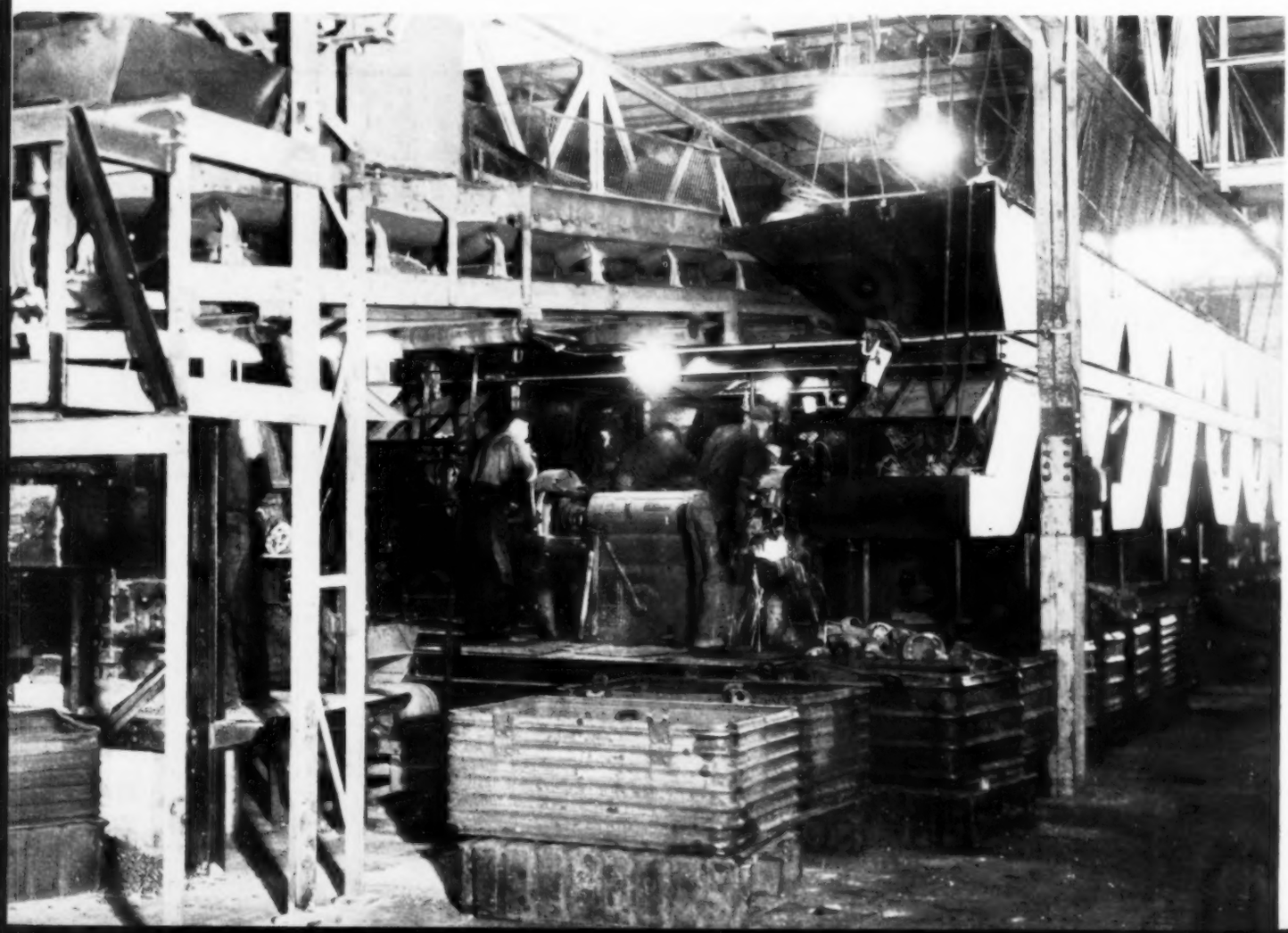
In some castings the cut is straight, while in others the descending cutting member is shaped to fit the contour of the casting. The trimmed castings are thrown on a horizontal belt which discharges them on to a short transverse belt which in turn transfers them to the inclined belt shown at the right of the hoppers in Fig. 4. At the top of the incline the castings fall over the end and again join the main stream from which they temporarily were detoured.

### Operators Remove Castings from Belt

This stage of the journey is shown in the upper left Fig. 3 where the shallow hopper at the extreme top guides the falling castings on to the main belt shown where it passes around the pulley immediately underneath. A catwalk parallels the belt from one end to the other. Several men stationed on the catwalk pick out the castings as they pass on the belt and throw them into hoppers on either side. A steel screen erected above the outer edge of the hoppers prevent the castings from overshooting the edge and falling to the floor. This merely represents an extra precaution since the bins are ample in size, within easy throwing distance from the operators and rarely filled to overflowing.

A battery of double stand (*Please turn to page* 77)

**Fig. 3—Castings are removed from the conveyor belt shown in the upper center and placed in hoppers which are easily accessible to the grinding machine operators**



# Install That New Equipment Now

By ARTHUR J. TUSCANY
Executive Secretary
Foundry Equipment Manufacturers' Association,
Cleveland

THE suggestion that now is the proper time to buy foundry equipment perhaps would be received by many foundry executives in a very different way from that which might be hoped for by the equipment builder. In many cases the foundry executive might take the equipment salesman hurriedly to his raw material yard, wave his hand toward a good sized pile of pig iron and scrap, then escort him into his molding department, shroud him with a pitying look, and invite him with some little emphasis to please indicate how in the name of high heaven he can find a way to keep busy some larger portion of the equipment he now has in his plant.

He might further quote figures relating to percentage of capacity at which his plant now is operating, or if he is of that once rare variety of foundry operator—whose number has been growing recently—who has a good cost system, he might refer to percentage of normal at which his plant is operating.

His next suggestion might be that the salesman contact some of his best customers and secure from them releases on some portion of many idle patterns now in his shop. Or he might suggest an approach to his competitor to learn how he can do business at such ridiculously low prices. Incidentally it is just possible that his competitor might be very much better equipped and that is one outstanding reason for improved quality and lower costs.

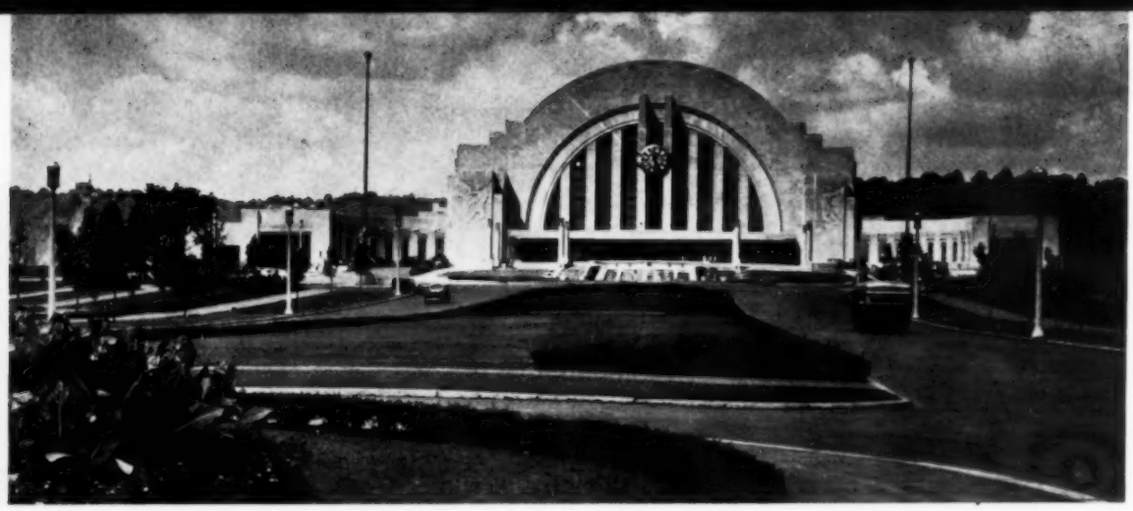
While there may be some foundries which could not properly and profitably purchase new equipment at this time, in the vast majority of plants there are sound reasons why *Now Is The Time* to purchase new equipment, revamp the old, and generally improve the physical side of the foundry. The wise foundry operator will consider the following reasons for revamping his equipment set-up at this time.

It is just fundamental for an improvement in business to follow a period of low rate of activity; it has always happened in the past and it is sure to happen again. The American business man can reach very low depths of despondency and despair during a recession in business and, on the other side of the picture, can surely climb the heights when business is on the upgrade. This latter trait incidentally is one reason why Americans are encouraged to take a chance, and this chance-taking has led to results achieved by no other country. So getting ready for the active period ahead is just good business.

Most foundries, like other businesses, have grown largely by plowing earnings back into new, improved equipment and enlarged plant facilities. This has been the usual method for small plants to grow to middle sized establishments, and middle sized organizations to larger ones. The changes in the tax laws made by the last session of congress show that it is much easier today to pay for new equipment from earnings than it was in 1937.

A year ago combined undistributed profits and corporate income tax would run slightly more than 30 per cent of a company's earnings. The work of those representing business interests at Washington and the willingness of some of our lawmakers to face facts fairly has borne fruit and today the total maximum tax is 19½ per cent of a company's earnings. This permits approximately 12 per cent more earnings to be reinvested in new equipment and plant expansion.

But tax savings is perhaps one of the least of the many sound reasons why equipment modernization and plant improvement is particularly helpful to the foundry operator at this time. Frequently the addition of new equipment suggests certain changes, improvements or additions in buildings. These changes can be provided best at a time when the building trades are not so busy. Lower costs and improved quality can be expected. Many skilled men are available today; their daily output will show a substantial increase over, say, 1937. On this point a top executive of one of the national engi- (*Please turn to page* 80)



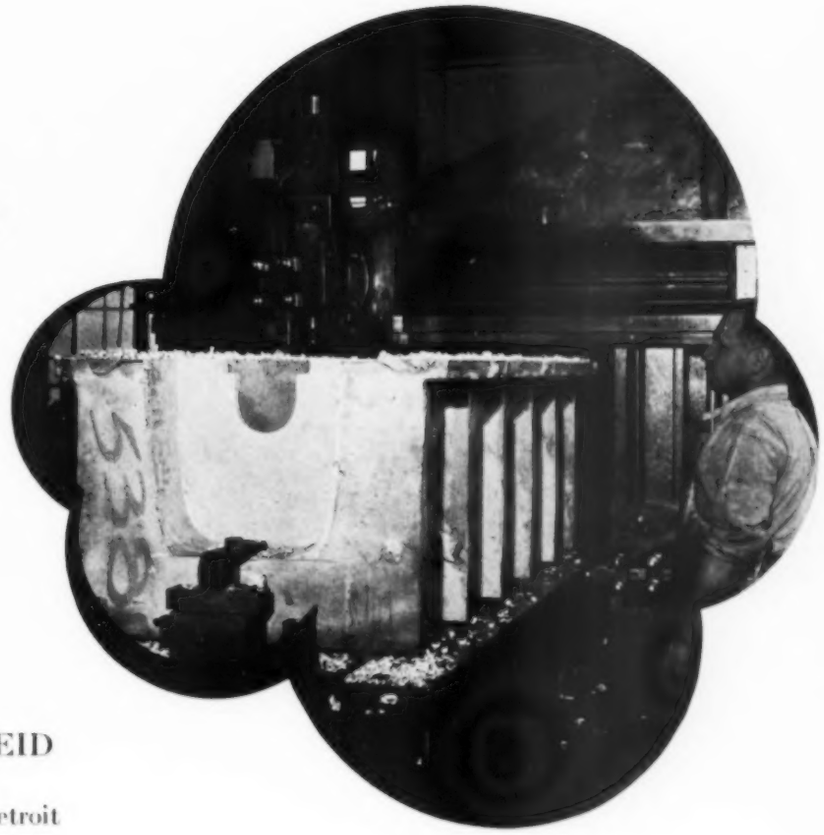
# A. F. A. Selects Cincinnati

CINCINNATI has been selected as the place of the 1939 annual convention of the American Foundrymen's Association, with the meeting opening Monday, May 15 and continuing through Thursday, May 18.

The 1939 convention will be held without an exhibit and patterned after the successful technical meetings held in Chicago at the Edgewater Beach Hotel in 1927, and at the Royal York Hotel in Toronto in 1935. The entire program will be devoted to technical, management and general interest sessions, shop operation courses, round table discussions and committee meetings, plant visitation and social functions.

Cincinnati was selected from among the several cities under consideration by a special convention committee whose recommendation was unanimously approved by the board of directors. Local interest, geographical location, hotel accommodations and the importance of the metal manufacturing industry in the Cincinnati district were determining factors.

# Patterns Must Be Good



By VAUGHAN REID
President
City Pattern Works, Detroit

BRASS or bronze castings for patterns should be made from a metal that can be easily machined or hand finished. The casting also should be hard to stand plenty of wear. After experimenting with many different alloys we found that a metal containing 87 per cent copper; 3 per cent lead; 2 per cent zinc; and 8 per cent tin seems to give the best results. It is much harder than the standard 85 and three fives —85 per cent copper, 5 each lead, tin and zinc—commonly used, and patternmakers have no objections to finishing this material. We are using grade *C* meehanite iron castings for patterns. The iron has a tensile strength of 50,000 pounds per square inch at 70 degrees Fahr. and a brinell hardness of 200. This iron needs no normalizing process and the hardness and grain are uniform throughout.

We have tried all kind of aluminum mixtures for pattern work to find that the analysis is not as important as the method and care used in melting. Analysis of the metal we are now using shows 6 to 8 per cent copper; 2½ to 3 per cent silicon, and the remainder aluminum. Formerly for a deoxidizer we used zinc chloride, but we now are using magnesium chloride for the simple reason the fumes are much less with magnesium chloride. In actual practice one was as good as the other as far as the quality of the aluminum castings was concerned.

Years ago we had a great deal of trouble from pin holes in aluminum pattern castings. After trying all kinds of analyses to overcome this trouble two causes were discovered: First, stirring the molten bath or transferring aluminum from the furnace to a pouring ladle. We now use the pot in which the aluminum was melted to pour the metal into the mold. For small castings we use a furnace that melts two 50-pound pots of aluminum. These small pots are lifted from the furnace and used for pouring the castings. For larger castings a crane picks the iron melting pot from a larger furnace holding 350 pounds of aluminum, carries it to the mold where the metal is poured directly into the sprue. Handling molten aluminum in this manner has been a great help in eliminating pin holes.

### Hydrogen Cause of Pin Holes

The second cause of pin hole trouble is that when aluminum is being melted, particularly in an oil fired furnace, and the flame is allowed to sweep over the top of the pot, there is a combination of free carbon and water given off due to incomplete combustion of the oil. This material falls into the bath of molten aluminum where the water breaks up into its component parts of hydrogen and oxygen. The oxygen combines with the carbon to form carbon monoxide or carbon dioxide. The hydrogen remains in the metal as a free gas until after the castings have been poured and become solid. Then of course it will unite with the air. Space taken up by the hydrogen in the metal leaves these so-called pin holes. By eliminating these causes we now get solid castings free from all pin holes.

A pyrometer always should be used when melting

aluminum for pattern castings. The aluminum never should be brought to a higher temperature than necessary for the job, a feature depending on the wall thicknesses. This is very important in the production of good, clean, aluminum pattern castings.

Making cast aluminum plates years ago we mounted the pattern on a wood board well braced so that it would remain straight. The cast aluminum flask had wood bars cut to the shape of the pattern. At that time it was quite a problem to get the cast aluminum plates perfectly parallel and straight. Now we use a cast aluminum follow board. In the center a proper space is cut out to fit the various standard flasks. The master pattern mounted on the wood match is inserted in this space. Even after doing this we still had some trouble keeping the plates perfectly straight. Looking around for the cause and a possible remedy we decided on an adjustable aluminum flask bar. A bar about 2 inches wide and corrugated lengthwise is placed across the flask.

### Use Adjustable Flask Bars

Aluminum castings about 1-inch wide and half an inch thick are corrugated to fit the corrugation on the main bar after the manner of chuck bars. They are bolted to the long bar. No matter what shape the pattern, the bolts can be loosened to make the bar any desired shape. This is cheaper than a wood flask bar and it certainly is much more convenient. The same bars can be used over and over again without having to scrap anything. Small bars are of varied lengths. The long ones are used for deep pockets. Since this system was started several years ago we get cast aluminum plates within four or five thousandths of an inch of being perfectly parallel. This is very accurate for a casting as it comes from the sand.

In making aluminum driers the same care must be used as when making other pattern castings, but an aluminum drier casting never should be worked to fit the slug until it has been properly annealed. In fact, all aluminum castings used in pattern work should be annealed. Annealing process for driers should be at 500 degrees Fahr. for about 6 hours and they should have two treatments of this kind. Driers and machined castings keep their shape much longer if treated in this manner.

One of the great faults in the design of some metal pattern equipment is that they are built more like toys than foundry tools. Metal pattern equipment, especially that used in a jolt machine, should be built so that it will not fall apart in use. As far as possible the pattern should be a single casting as few pieces as possible bolted or screwed. You all have seen a transmission case pattern for example. When completed it was a beautiful job but after a few months in the foundry the different parts that once were well riveted or bolted together g r a d u a l l y loosen up through continued jolting and vibration. This type of pattern equipment entails the expenditure of large sums of money in repair bills before the pattern has served its purpose. Even after repair bills have been met, the castings obtained from the repaired pattern are not as uniform as when the pattern first was put in use. Irregularities in castings made from the repaired pattern begin to show up in the machine shop. Trouble of various kinds is experienced and the cost of machining the castings immediately is higher. Metal pattern equipment should be especially strong and durable, well ribbed, and wherever possible cast in one piece.

Modern molding machines are strong and substantial with plenty of strength in each moving part, but even they need care and plenty of repairing. So why build a flimsy metal pattern when it will become part of a heavy, well built molding machine? Patterns should be just as strong as the machine on which they are to be a part.

In designing aluminum core boxes, some thought always should be given to the walls so that they will be as uniform in thickness as possible. Although aluminum is used for its lightness, that is no excuse for making the casting itself too thin. Give all the parts as much strength as possible because, as a rule, coremakers and molders are not patternmakers and they use the equipment as they see fit. Their only thought is get all the molds they can each day and use the pattern as long as they can. When it breaks down it will just be another job for the pattern shop to repair.

### Should Maintain Pattern Engineering Department

The stripping plate method of molding seems to be less popular than it was. Many pattern equipments today are made for the rollover drop type machine. Many of the pattern equipments are made in one piece. Therefore, pattern shops must consider the investment for many special tools and good equipment so that a pattern of this type can be machined all over without resorting to machining of the many parts to be assembled.

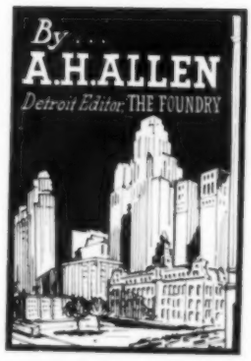
The modern pattern shop should maintain a pattern engineering department for designing any kind or size of pattern equipment required. Designers should be well acquainted with all makes of molding and core making equipment. Many customers appreciate the services of a department where they can look for complete service to have their pattern requirements designed and made to fit any foundry. This department makes drawings and blue prints to be furnished customers for their approval. They also make the layouts for the patternmakers on sheet aluminum.

In the layout room the finished lines on the pattern casting are all laid out for the machine man. This eliminates the possibility of the machine standing idle while the operator determines the amount of stock that must be removed from the various surfaces. In this room also, the finished pattern gets a thorough inspection before it leaves the shop and is checked carefully for accuracy before it is released to the foundry. The inspectors have a regular inspection card on which must be noted every item that is not exactly according to engineering department specifications. They do not have authority to let anything (*Please turn to page* 78)

This is the second and concluding part of a paper presented May 12, 1938, before the St. Louis chapter of the American Foundrymen's association by Vaughan Reid, president, City Pattern Works, Detroit. The first part of the paper appeared in the October issue.

# Among Detroit Foundries

**Dropping the cupola bottom at the end of the heat produces a pyrotechnical display worthy of a movie mogul's conception of Dante's Inferno. Illustration courtesy of Pontiac Motor Co. division, General Motors Corp., Pontiac, Mich.**




HAVE you ever wondered what becomes of the thousands of empty tin cans which once held the oil put in your car at service stations? Nearly all high grade oil is retailed in cans. The oil appetite of thirty million automobiles operated throughout the country is enormous. Disposal of these cans is more than a mere problem of rubbish collection.

The cans are tinned and for that reason are not acceptable as scrap for steelmaking purposes. The tin coating is so thin that it is economically unfeasible to run the cans through detinning operations. For their weight they occupy an annoying volume—so what to do?

A Detroit foundry has supplied the answer to the disposal of a large share of such material in this district. The cans are returned to their original cartons after being emptied. The delivery truck bringing cartons of fresh oil to the stations picks up the old cartons and delivers them to this foundry. Here they are turned out of the cartons and the latter sold to a nearby wastepaper yard while the cans are piled up waiting charging in the cupola.

What sort of a foundry charges old tin cans in its cupola? Obviously about the only answer possible is a sashweight maker. The plant of Johnston & Jennings Co., located in the open spaces of the city's west side is devoted almost exclusively to the casting of sashweights. Occasionally mill stars and other hard iron castings are poured as the demand dictates.

A sashweight foundry has no problem of iron analysis, pouring temperature, microstructures, temper carbon or retained carbides. It is solely a matter of dollars and cents—how to make the least expensive iron, how to cast it as cheaply as possible, how to obtain the least costly labor. With the average selling price of sashweights about 1½ cents a pound or $30 per ton, it readily can be seen that profits are going to depend in a large measure on getting iron out of the cupola at an exceptionally low figure.

This means cheap scrap and cheap fuel. Hence the scrap usually comprises the tin cans which cost practically nothing and a fair share of the lowest grade of dealer scrap, rusted and bent auto fenders, old roofing sheets—in fact anything that is chiefly iron. For fuel a No. 2 foundry coke is bought, for the reason that it is the least costly fuel per pound of carbon content, and the high sulphur and ash mean nothing as far as the product is concerned. A rather high ratio of coke to scrap (1:5) must be maintained in the charge due to the *tough* nature of the material being melted.

The J & J plant is laid out ideally for continuous flow of production from the cupola to shipping dock. A 70-foot 3-ton yard crane travels at a height of 30 feet over an outside yard and is used to unload sand and coke, as well as to charge the cupola, in conjunction with a separate monorail charger equipped to weigh material on the fly.

The 60-inch cupola melts at the rate of 12 tons per hour. It melts about 25 tons per day and is operated on alternate days, with in-between periods used to prepare molds. Iron is tapped from the cupola into 1400-pound ladles which travel on a net- (*Please turn to page* 95)

# Furnaces Operate On Clean Oil

By E. H. CARRUTHERS
Goulds Pumps Inc., Seneca Falls, N. Y.

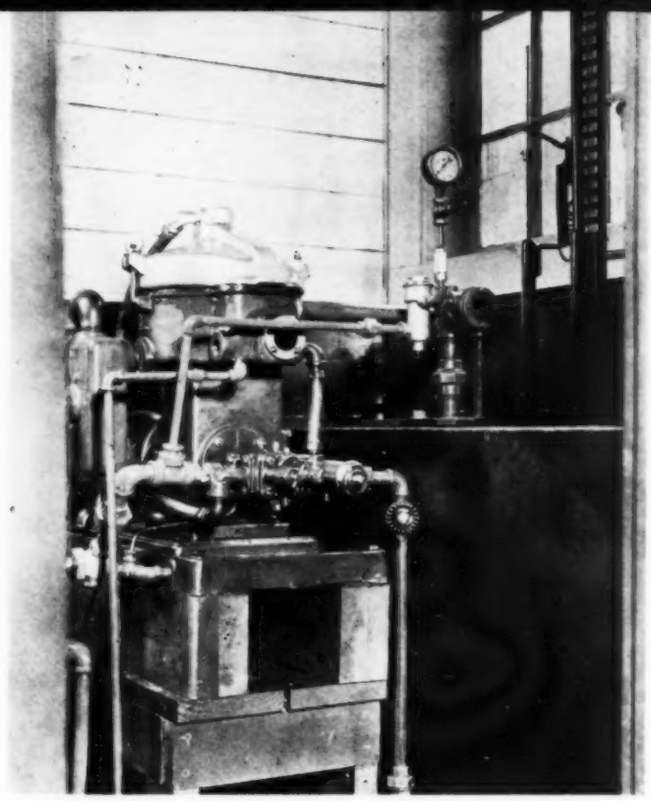


Fig. 1 (Above)—Hydroil installation showing Day tank and piping. Figs. 2 and 3 (Below)—Two views showing the arrangement of the oil-fired furnaces

OIL fuel supply which is perfectly clean has proved to be an important factor in the economical production of castings in the brass foundry of Goulds Pumps, Inc., Seneca Falls, N. Y.

While a rather wide range of metal mixtures and shapes are produced, nearly all castings become parts that will be subjected to hydraulic pressure. Therefore, uniform metal textures and pressure tightness are necessary qualities. The melting practice plays an important part in obtaining these qualities. A rather simple and trouble-free installation of furnaces and fuel handling equipment is in use. The maintenance of constant furnace atmospheres and uniform melting speeds, with the accompanying simplified control, are important features of the design.

Stationary lift-out crucible furnaces are used for all metals except aluminum which is melted in a tilting furnace. The stationary furnaces are uniform in outside dimensions, but may be lined for either No. 80 or No. 100 standard crucibles (240 and 300-pounds capacity).

The rather large combustion chamber on each furnace especially is adapted to oil firing and allows combustion to be nearly complete before the gases come into contact with the relatively cooler crucible. The chamber diverges in conical shape from the burner, then converges to a tangential entrance into the main crucible chamber, the lower contours of which are designed to give a full swing of the gases around the bottom wall of the crucible.

The fuel atomizer is of the pressure type, the nozzle itself controlling the flow rate of fuel. This eliminates the use of manual regulating valves which ordinarily would have to be adjusted each time the flow is started. Oil is supplied to the nozzles from a common header in which the pressure is maintained at 100 pounds per square inch. A shut-off cock between the header and nozzle, operated simultaneously with the fan control switch, starts or stops the burner. The oil nozzle is located just back of the tunnel (*Please turn to page* 87)

# Core Making In the Brass Foundry

By N. K. B. PATCH

FOLLOWING a reference to oil core binders in a previous article, the present discussion will be devoted to some of the characteristics of and practices incident to the use of cereal and other water soluble binders. Pitch binders and resin binders also are used in the production of castings in the brass foundry. Manufacturers of these different types of binders are prepared to suggest the desirable ratio of sand to binder. That, of course, varies with the type of binder and the hardness of core desired. The fineness of the sand to be bonded will be influenced greatly by the rate of baking. Cereal binders, as flour or dextrine or other materials of a similar nature, may be mixed with a variety of sand and produce cores which break down under relatively low temperatures.

### Molding Sand Produces Smooth Surface

Where those binders are used with a relatively large proportion, say 25 or 30 per cent of molding sand added to the usual core sand of the silica type or washed beach sand, the resulting core has a very smooth surface and imparts a very satisfactory surface to castings poured from aluminum base alloys, zinc base alloys and the like. Permeability or venting power of course is reduced materially by the large percentage of fine sand in the total mix and also by the presence of clay in the molding sand.

Amount of water to be added in preparing the sand for making cores where water soluble binders are used, will vary with the different kind of binder used and also with the amount of molding sand used on account of the absorption of moisture by the clay bond in the molding sand. Baking must not be too rapid since the lack of permeability reduces the speed with which the vapor may be driven off. In the best practice these cores are baked at a temperature of 350 degrees Fahr. In large cores the center is filled with broken coke, cinders or gravel so that the venting power of the center of the core is increased materially.

### Should Provide Ample Vents

Ample vents should be provided and the vents should be led properly to that part of the core print from which the gases may escape through the mold to the open air. In washing the core surface, obviously it is desirable to use a water soluble binder to bind the core wash material. Where the cores are dipped in water dissolved core washes, the dipping should be done rapidly and the cores should be dried promptly so that the additional moisture on the surface has little opportunity to penetrate the core surface.

These cores—and of course this applies to practically all cores—must be handled carefully. When placed in the mold the casting operation should take place as soon thereafter as possible to avoid moisture absorption by the core from the green sand of the mold. Where the wall thickness of the casting surrounding the core is relatively thin and the metal is hot short and shows a tendency to rather high shrinkage, the cores must be soft and must burn readily so that shrinkage may not be retarded.

This condition demands the use of a binder affected by a small quantity of heat energy. Cereal or water soluble binders are eminently satisfactory in this respect. Cases exist where conditions are so trying that even cereal or molasses (*Please turn to page* 82)

# Preventing

SHRINKS and blowholes arise every so often to plague the foundryman. They are the cause of defective castings and necessitate repetition of the operation or a large salvage cost.

Every foundryman at one time or another has been confronted by a defective casting due to a shrink. Perhaps nothing is more aggravating than a shrink, particularly on a rush job. Still worse is a rush job with an internal shrink that does not show up until a cut has been taken and the casting goes into a different shop to be machined.

Shrinks result from a change in volume taking place in the metal while passing from the liquid into the solid state. Total volume decreases since metal occupies less space in the solid state than in the liquid state. Contraction during the period of solidification may manifest itself in three distinct ways: As a crack, an internal void, or a surface defect or draw.

### Cast Iron Is Not Elastic

A crack may result from a casting having unequal sections from a relatively thin section to a heavy section. It may also occur on sharp corners. The thin section sets perhaps almost as soon as the casting is poured, if it is sufficiently thin. The larger and heavy section does not set for some time, but when it does, being comparatively heavy and with a correspondingly larger contraction, it pulls the smaller section to such an extent that a rupture occurs. Cast iron generally is regarded as a metal with no elasticity. It has some, but this stretch or elastic property is very small. In case a rupture does not occur, the thin section is under a strain and subsequently may result in a rupture.

Internal shrinks can be found as distinct holes in castings. Occasionally only a slight segregation occurs, or in some cases no segregation can be seen but the metal is so coarse as to be porous, thereby unfitting the casting for pressure work. Internal shrinks result from insufficient feeding during the solidification period. The metal sets on the circumference or outer portions and insufficient metal is left to fill the remaining space when total solidification takes place.

A surface defect or draw is similar to an internal shrink, except that instead of segregation in the interior of the casting the last metal to set draws from the surface. This most frequently happens near a riser where the metal has been kept more fluid due to the heat of the riser. It may occur near a gate for the same reason or on any exterior part of a casting, if that is the hottest portion.

The statement has been made that an absolutely perfect casting never has been poured. That may be true, but I have seen castings so nearly perfect that the difference could not be determined. If one can regulate the rate of solidification and introduce fresh metal at just the proper rate and temperature a perfect casting will result. We can approach these conditions so nearly with proper risering, gating arrangements, pouring rates, pouring temperatures, and iron composition that for all practical purposes perfection is obtained.

Shrinks are caused by poor melting, incorrect heat gradient, improper iron composition, incorrect gates and risers, improper pouring rates and temperatures, and perhaps one of the most conducive of all—incorrect design.

Shrinks frequently are due to the iron itself. Oxidized iron has a high freezing point which shortens the fluid life of the iron. A casting with sufficient risering to give soundness when poured with good fluid iron may show a shrink when poured with slightly oxidized metal, due to the feeding being cut off prematurely. Oxidized iron also has more combined carbon which will cause a correspondingly greater contraction.

### Ideal Casting To Cool at Same Rate

The proper heat gradient is a very important item that must not be overlooked in preventing shrinks. Generally it is possible to gate a casting at a thin section so when poured the hottest iron is at the thin section, thereby retarding its rate of solidification somewhat in relation to the heavier sections. The ideal heat gradient would be an arrangement that permitted the entire casting to set at the same rate. This seldom is possible with varying sections, but a great deal can be done in that direction.

Pouring with the wrong type or composition of iron for the cross-section is another source of shrinks. One hardly would attempt to pour a chunk with stove plate iron. A heavy section should be poured with iron that sets relatively fast. The longer the period of solidification, the more opportunity is given for segregation, unless good feeding of fresh metal is permitted.

Proper position and number of gates is just another way of trying to get the proper (*Please turn to page* 84)

# Shrinks and Blowholes

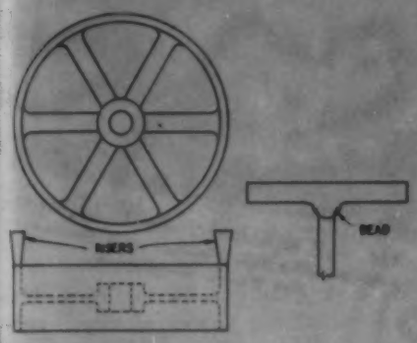



FIG.1

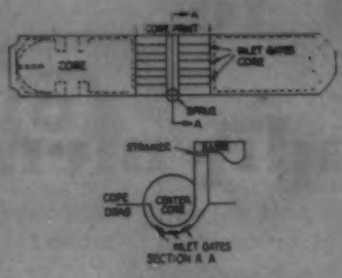



FIG 4

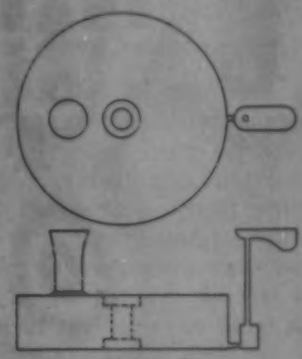


FIG.8

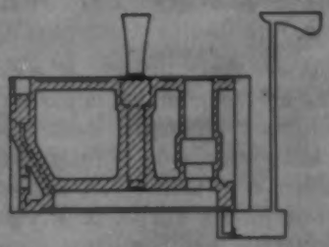


FIG.5

FIG.9

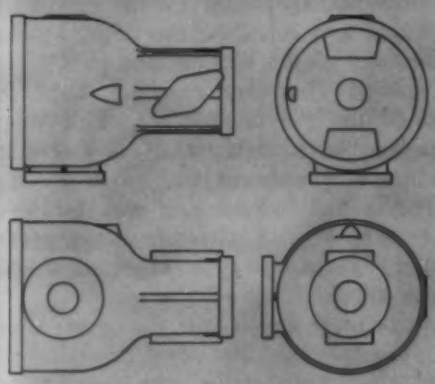


FIG 2

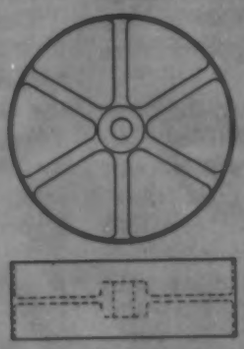


FIG6

FIG.10

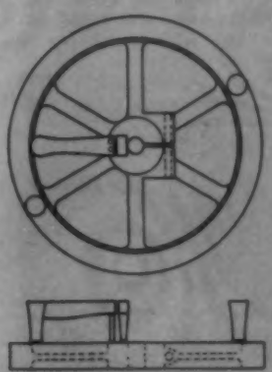


FIG.3

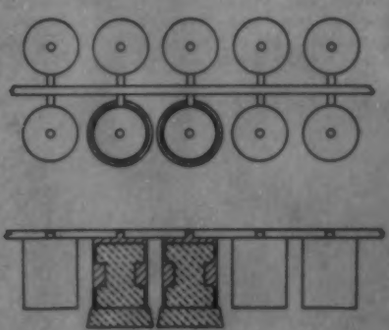


FIG.7

By

ELMER J. CARMODY

# Poland Is Host to Foundrymen

Fig. 2—F. W. Hobbs, South Africa, sitting astride over the Czech-Polish border in the Tatra mountains

By VINCENT DELPORT
European Manager, The Foundry

NEVER has a foundry congress taken place under such dramatic circumstances as those that attended the International congress held in Poland from Sept. 8 to 17. From the time when delegates from about 15 countries assembled at Warsaw until they left Krakow 10 days later, war clouds were gathering fast over Europe and the situation was becoming more and more tense. At the time of writing, after a week of intense anxiety, the immediate menace of war has disappeared and the outlook appears more promising.

It is a striking fact that, notwithstanding the presence of representatives from countries directly affected by the crisis in central Europe and Germany, the meeting was held in an atmosphere of good fellowship and mutual consideration for one another's feelings, and not a single word was said, either publicly or in private, that could lead to heated discussions or acute controversy.

It was said on more than one occasion, and from opposite sides, that if political negotiations were conducted between peoples and statesmen with the same restraint as was evident at the congress, the path of nations would be much smoother than it is. Here is a valuable feature to be placed to the credit of international technical and scientific meetings, among which foundry meetings play a conspicuous part.

The congress opened Thursday morning, Sept. 8, in the auditorium of the Polytechnic school of Warsaw, with the minister of industry and commerce in the chair. An address of welcome was given by the director of the Polytechnic school and was followed by the opening speech by Prof. K. Gierdziejewski, president, Polish Foundry Technical association, who was responsible for the organization of the congress.

After thanking the high authorities that had given their patronage to the congress, President Gierdziejewski welcomed Dr. Paul Schwietzke, president, Tech-

Fig. 1—Group of visitors taken at the works of Wegierska Gorka. In the front row counting from the left: V. Delport (5) U.S.A.; Prof. Gierdziejewski, president, Polish Foundry association; Dr. Paul Schwietzke (9), president, International committee; G. Buzek (11), managing director, Wegierska Gorka; Dr. Jungbluth (14), Germany; Tom Makemson (16), honorary secretary, International committee; Second row—F. W. Hobbs (4), South Africa; Prof. Pisek (6), Czechoslovakia; R. Deprez (7), Belgium; Third row—F. Altenstein (7), Hungary; Dr. Geilenkirchen (8), Germany; Prof. W. Brandsma (9), Holland. At end of top row, D. Spring, Australia.

nischer Hauptausschus fur Giessereiwesen, Germany, and president, International Committee of Foundry Technical Associations, and also the delegates of foreign foundry associations, who came from Australia, Belgium, Czechoslovakia, Dantzig, France, Germany, Great Britain, Holland, Hungary, Italy, Luxemberg, Rumania, South Africa, Switzerland and the United States.

The speaker made reference to the foundry industry of Poland, mentioning the existence of about 425 foundries, including 231 gray iron foundries, 12 malleable foundries, 23 steel foundries and a large number of nonferrous foundries. Production of iron castings in 1937 amounted to about 175,000 tons. The foundry industry of Poland gives employment to about 16,000 men. Polish foundries chiefly are attached to iron and steel or engineering works.

Dr. Paul Schwietzke responded to the president's address on behalf of the foreign delegations. The formal opening concluded with a short address given by the minister of industry and commerce, who voiced the appreciation of the Polish government at the fact that Poland had been chosen as the seat of the congress, and expressed the hope that the work of the congress would be fruitful and would bring about a closer understanding among the representatives of the various nations. At the close of the meeting a message of greeting was sent to the president of the Polish republic on behalf of the Polish and other foreign associations.

After the opening speeches, a session of technical papers was held and was followed by an official luncheon. In the afternoon the visitors were taken over the laboratories of the Institute of Metallurgy and Metallography, where research work is conducted with the help of the most modern apparatus in the interests of the government and private industry.

On the morning of the next day, Sept. 9, the members visited two engineering foundries on the outskirts of Warsaw. At the works of Lilpop, Rau & Loewenstein, S.A., castings are made for railroads, diesel engines, machinery, airplanes and automobiles. The government works of Ursus was specializing in automobile castings, and there could be seen a good example of aluminum die-casting.

### Visit Polish Technical School Foundry

Technical sessions took place in the afternoon of the same day. At the end of the session, a number of delegates from the various foreign technical associations were conducted by President Gierdziejewski through that section of the Polytechnic school which is given up to the Polish school of foundry, which he founded a few years ago. More papers were discussed in the morning of Saturday, Sept. 10, and in the late afternoon members of the congress were received at the city hall by the president (mayor) of Warsaw.

The morning of Sunday, Sept. 11, was devoted to meetings of the International Committee for Testing Cast Iron and the International Committee of Foundry Technical associations. The cast iron testing committee meeting was held under the chairmanship of its retiring president, J. Leonard, immediate past-president, Association Technique de Fonderie of Belgium. At the close of the meeting, J. E. Hurst, past-president, Institute of British Foundrymen, unanimously was elected to the post of active (*Please turn to page* 88)

**Fig. 3—Group taken before laying the wreath at the tomb of the Unknown Soldier**

# QUESTIONS and ANSWERS

## Improper Melting Conditions Result in Porosity

We are operating a small brass foundry and are experiencing some trouble in making such castings as coil outlet ends, flanges, caps, etc., pressure tight. These castings sometimes are made of 90 per cent copper and 10 per cent tin; 85-5-5-5, and quite often brazing brass 85 per cent copper and 15 per cent zinc. We would appreciate very much if you could tell us what causes the porosity in the castings and how we can overcome it. The trouble does not seem to be due to shrinkage caused by different thicknesses since, as in the case of the cap, the whole casting is porous.

Your statements indicate that your trouble does not necessarily result from inadequate feeding but is a condition that is caused by the absorption of gases in the melting of the different alloys. It might be possible that the trouble arose from molding or core making but evidently you are having porosity which allows leakage to occur when subjected to hydraulic pressure.

Obvious correction for such trouble is to study your melting conditions eliminating the presence of dissolved gases in the metal. In the case of the 90 per cent copper, 10 per cent tin alloy, a small amount of phosphor copper will be beneficial to the alloy without any question. Presence of the zinc in the other two alloys will serve to deoxidize the alloy satisfactorily if good melting conditions are maintained.

All three of the alloys shrink and need feeding, but if the sections of the castings are relatively thin and the castings themselves are relatively small, the proper size gate and runner will serve to do the feeding, if the temperature of pouring is maintained at the right point. We wish to state that there is no medicine that you can add to the alloy that will correct your difficulty. Correct the difficulty by melting the metal in a slightly oxidizing atmosphere and at the highest possible speed for the furnace you are using. Subject the metal to the furnace atmosphere for the minimum length of time. The moment it has reached the desired temperature remove it from this atmosphere and pour it into molds.

In all probability your molding and core making practice is about the same as it has been in the past and this porosity is probably traceable to furnace practice, which may or may not be due to lack of supervision. Possibly you have a slightly different operating condition in the melting department. Your furnaces may have become clogged with slag so that the combustion is no longer up to par. Some clogging of the air lines may have occurred so that an ample supply of air no longer is available for combustion. Possibly you are using fuel oil and the grade you are accustomed to is not now available and you are being supplied with a slightly different one demanding a change in your burner adjustments and control.

Certain types of weather change combustion conditions in the furnace so as to alter the kind of gases to which the melt is subjected during the process of melting. Such variations in the weather mean that the furnace operator must compensate for them so as to maintain the proper atmosphere to insure minimum harm being done to the metal. Also, it will pay you to preheat your furnaces before you put the metal in and thus reduce the time that the metal is exposed to furnace gases.

## Application of Flour to Mold Brings Dust Problem

Our sand foundry makes brass castings. In our molding practice, after the mold has been made the cope is removed and set to one side in a vertical position. We then blow flour over the cope portion by forcing a stream of air through a small salt bag filled with flour. In this way we get an even distribution of flour over that portion of the mold. However, there is considerable objection to this practice because of the amount of dust raised. Could you advise us of other methods of performing this operation which will eliminate the objectionable feature of flour dust in the air? Also in that connection would ask if you know of any manufacturers who are producing and selling air guns suitable for such a purpose. Any information you may be able to give us will be appreciated.

Application of compressed air in blowing flour on your molds increases materially the dust problem. The mere shaking of a salt bag of flour over the mold to localize the dust close to the mold is the usual system of applying flour. However, modern foundry

practice has developed the fact that unless there is some important effect to be produced by the flour, it can be eliminated entirely. In other words, where the castings are to be machined later and the skin appearance is of no importance, the application of flour is unnecessary. The important thing to insure good castings is to have the sand in the right condition and containing the proper amount of bond. That means bond enough to hold in proper shape and moisture enough to give satisfactory bonding, but not enough moisture to cause blowholes (about 7 per cent moisture).

Under modern conditions of sand control, application of flour to molds has been eliminated in foundries where production is large. If, however, the surface of the skin of the casting is of vital importance, the application of flour does tend to give a better appearance, and possibly some ingenious method may be discovered to localize the dust problem. A hood might be supplied under which the flour is applied, the hood being moved from mold to mold. It also could be attached, if necessary, to an exhausting system that would take away the dust from the operator.

The fact that you do not apply the flour to the drag as well as the cope of the mold leads us to believe that you are applying the flour for some reason other than the skin appearance. Possibly you can substitute something else for the flour. Have you tried brushing on dry graphite blackening with a fine camel's hair brush; or smoking the mold with an acetylene flame or a kerosene flame supplied with an insufficient amount of air to complete the combustion? This would coat the mold with carbon which would give very satisfactory skin appearance. This has been done largely in the manufacture of ornamental castings. A smoky film over the surface of the mold will deposit a thin layer of carbon or lamp black, which will act very much as the flour does upon the entrance of the molten metal into the mold.

## Desires Suitable Mixture For Grinding Disks

We have an opportunity to quote on some cast iron disks. These are to be made of hard iron and are used to grind old brake bands, rubber tires, etc. The sides opposite the grinding faces are to be machined. We understand that these castings weigh about 10 pounds each, but we do not have any detailed information. The castings must be hard enough to wear well and not so hard that they will break off. We understand that they have teeth or ribs on the grinding side. Can you give any information on a suitable mixture for the castings?

We believe that the most suitable material for the grinding plates you mentioned is an alloy iron which in addition to the usual elements contains approximately 4.5 per cent nickel, and 1.5 per cent chromium. The resulting castings poured in sand molds will be extremely hard, and will give good service. To further improve the properties especially in view of the fact that the grinding plates undoubtedly will be subjected to severe shocks or impacts due to the presence of metallic components which will enter with the materials to be ground, it is suggested that the grinding plates be heat treated as follows:

Heat the plates slowly up to 1650-1675 degrees Fahr., and hold at that maximum temperature for one hour for every inch in thickness of the heaviest section. Then quench in oil and draw the castings at 400 degrees Fahr. Cool in the furnace or in still air. We note that you mention that the side opposite the grinding face of these castings is to be machined. However, due to the extreme hardness of the castings, machining is out of the question, and any finishing operation will have to be performed by grinding with suitable equipment. We believe that with a little care the castings can be made sufficiently accurate so that little if any finishing will be required. It may be well to point out to your customer that it will be well to omit any machining operation if it is possible to do so.

## Melt Gray Iron in Crucible If Furnace Is Suitable

We shall appreciate any information you can give us on melting gray iron in a crucible. We operate a brass foundry and do not anticipte enough gray iron business to warrant installation of a cupola. We are interested principally in making high quality iron bushing stock. What grade of sand should be used for the molds and cores? Should the crucible charge be made up of pig iron or scrap or both? What type of flux or other addition is needed to make a good grade of cast iron bushing stock?

Cast iron readily may be melted in a crucible provided the furnace is capable of developing a temperature in the vicinity of 3000 degrees Fahr. Cast iron melts at approximately 2100 degrees Fahr. and it is sufficiently fluid at 2400 degrees to pour large, heavy castings, but it must be raised to a temperature of approximately 2700 degrees to permit handling in small quantities and for pouring into small castings. If your present sand is satisfactory for general jobbing brass castings, it will serve equally satisfactorily for gray iron castings of similar size.

If the sand fuses to the castings, it is not sufficiently refractory and should be replaced with a more refractory grade, or *doctored* with an addition of sharp sand in the facing. The crucible charge may be made up of materials in almost endless variety, provided the combination will yield the desired analysis in the castings. Which is another way of saying you must decide in advance the chemical composition and probable physical properties desired in the casting, and then make up a charge to meet these conditions.

At least an elementary knowledge of metallurgy is a basic essential. Either pig iron or scrap may be melted, but since pig iron is large and bulky in the delivered condition, scrap broken small usually is used in charging crucibles. A fairly accurate knowledge of the composition of the scrap is necessary so that required additions of ferrosilicon, ferromanganese or other alloys can be made intelligently.

## Dip Swivel Eyes in Oil and Sand

What is the best material and method for coating the inserted ends of small swivel eyes in castings so that they will revolve freely after the castings have been water rolled? I have dipped them in molasses water, coated them with fine burned sand and dried them in the oven, but the result is not entirely satisfactory.

The practically universal method for coating these and similar inserts is to dip them in core oil, then into very fine sharp sand, also known as river sand, core sand, silver sand and sugar sand in various sections of the country. The coated inserts then are dried in the oven in the same manner and at the same temperature as ordinary cores.

## Try Open Sand for Clean Casting

We are enclosing a sketch of a heavy cast iron ring 42 inches inside diameter, 90 inches outside diameter and 8 inches thick with a slight recess or shoulder 2 inches wide on the inner circumference. The bottom of the casting is chilled and the mold is poured in the position shown in the sketch. Metal is poured from two ladles on opposite sides and enters the mold through six gates. Leaving the sand, the casting appears to be clean and solid on the cope side, but when the face is machined, blemishes from ¼-inch to 1¼-inch deep appear at various places as indicated at *A* in the sketch, and approximately about 22 inches from the outside.

You do not state the character of the blemishes, whether they are clean holes, or simply drossy areas. If the latter, as we suspect, they are traceable to the chill on the bottom. The iron does not lie quietly on the chill and the resulting ebullition creates masses of mixed material, mostly thin frozen shells of the bubbles which pass through on their way to the top. This material continues to float until the highest points touch the cope and the molten iron flows around and submerges the remainder immediately below the surface. Obviously the remedy is to provide a chill that will not cause the metal to kick and boil.

The chill should be treated in the same manner as the chill for a chilled roll. It should be cleaned thoroughly, heated to a temperature between 300 and 400 degrees Fahr., and then faced with a thin coating of blacking mixed with weak molasses water. The foundry supply houses have developed a special blacking for this purpose. Several methods are available for heating the chill. The method adopted will depend on local facilities and on whether the chill is left permanently in the floor, or shifted from place to place. It may be heated with a torch or with charcoal fires, or it may be left in the core oven all night.

A simpler solution of the problem would be to omit a cope and pour the casting in an open sand mold. Carry the walls of the mold approximately an inch higher than at present. Place a number of segmental ring cores around the inner circle to form the recess. A piece of pig

**Machined face disclosed defective areas approximately half way between outer and inner circumferences**

iron on each one will hold it down. Pour the metal from one ladle or two as most convenient. If the metal boils off the chill and creates a mass of slush, there is no cause to worry.

Wait until the mold is filled and then scrape all the foreign material from the surface with a skimmer. By that time the metal will be perfectly quiet. Touch it up a few times and then sift some facing sand over the surface through a No. 8 riddle. When a skin has formed on the surface, sand may be shoveled on to a depth of approximately 6 inches. The casting is uniform in cross section, therefore it will shrink and contract uniformly. The extra metal on top will take care of minor inequalities and can be removed in one or two cuts on the boring mill.

## Alloy Should Serve Satisfactorily

The enclosed print and sketch is made for a rotary valve casting. We poured this casting of 85-5-5-5 mix, using ingot metal, and it looked perfect. However, we would like to know if this is the proper metal to use, and if not, would you please advise us as to the proper mix?

The pressure of 25 pounds per square inch for the service of the valve seat ring does not indicate a severe demand and the revolution of ½ revolutions per minute indicates a slow speed, again reducing the demand for resistance to wear. The fact that this valve seat ring takes the wear suggests that a bearing metal will give the longest life but the slow speed does not cause excessive wear. Therefore, any good bearing metal would give reasonable service.

The water pressure is not sufficient to require a high grade valve bronze and it is commonly known that 85-5-5-5 is used for the medium grade of valve having a fine capacity for resistance to leakage at normal pressures of 300 pounds or less. The alloy is not considered a bearing metal since the amount of tin in proportion to the copper content does not produce a sufficient ratio of tin to copper to develop any of the delta constituent or hard bearing crystal which resists wear. However, since this bronze has to rub against cast iron, it probably is better that the bronze does not carry any of the delta constituent. Therefore, it would seem that 85-5-5-5 should give satisfactory service if properly cast. Obviously, the castings must be sound and not porous. Gas absorption during melting will produce some porosity which might cause leakage. However, with proper precautions, satisfactory castings should result.

## Cores Must Be Held In Thin Casting

We have a 4-pound aluminum casting which takes a center core and a jacket core to be held in place with eight chaplets. Thickness of metal in the casting is ⅛-inch. We shall appreciate your opinion on the type of chaplet to use, and the gage of metal. The casting must withstand a light pressure, therefore the chaplets must fuse thoroughly with the surrounding metal.

Since the walls of the casting are only ⅛-inch thick, you have not much choice in the size, shape, thickness or weight of the chaplets. With a pouring temperature between 1200 and 1300 degrees Fahr., the metal in a section ⅛-inch thick will set almost instantly and before it has had a chance to raise the chaplet to a fusing temperature. The metal may grip the chaplet fairly tightly, but certainly it will not fuse it to a pressure tight fit.

If the design of the casting will permit, you might form a small boss at each chaplet seat and thus provide a greater body of metal around the chaplet. Without any detail on the size, shape or other characteristics of the casting we cannot offer a definite alternative suggestion, but we are inclined to the opinion that by exercising your ingenuity you can devise some method for holding the cores in place. Perhaps it may be advisable to use core prints, and plug the cored holes with threaded inserts.

# 1% NICKEL *made 'em...*

**FOUNDRY FOREMAN** quit cussing when 1% Nickel increased fluidity and promoted better casting qualities from heat to heat.

**BOSS** started smiling when rejects stopped eating profits — no foundryman ever gets rich on rejects. Nickel added to bronze assures pressure tightness, increases tensile and compression strength, adds hardness with little or no loss in ductility: simplifies machining.

**CUSTOMER** relaxed when these Nickel bronze castings for locomotive boiler feed pumps withstood required pressure tests—and were sound and dense throughout.

**CONSULTING ENGINEER** beamed when finished Nickel bronze castings held pressures and, despite high temperatures, "proved satisfactory in every way."

## PRESSURE-TIGHT CASTINGS

These locomotive boiler feed pump castings were produced of a Nickel bronze composition:

| | |
|---|---|
| *COPPER* | 85% |
| *ZINC* | 5% |
| *LEAD* | 5% |
| *TIN* | 4% |
| *NICKEL* | 1% |

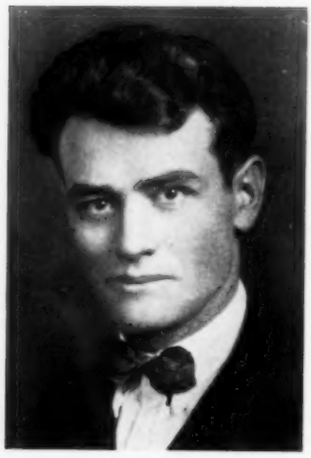
Castings by Textile Machine Co., Reading, Pa., for J. S. Coffin Jr. Co., Englewood, N. J. E. L. Schellans, Consulting Engineer.

**CAST**
# NICKEL
**BRONZES**

**THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.**

Frank A. Truel

Alfred L. Boegehold



William H. Ruten

Ira F. Cheney

# MEN of INDUSTRY

A L. BOEGEHOLD, chief metallurgist, General Motors Research Laboratories, Detroit, who delivered the Campbell Memorial lecture at the American Society for Metals congress and exhibition on Oct. 19, was born in Mt. Vernon, N. Y., in 1893. He was graduated from Cornell university, Ithaca, N. Y. in 1915 with the degree of mechanical engineer; joining the Remington Arms & Ammunition Co., Bridgeport, Conn., as mechanical engineer. Later he was employed successively as foreman in the electric melting department, Bridgeport Brass Co., Bridgeport, Conn.; metallographist, and subsequently, metallurgist for Remington Arms company; research metallurgist on machine gun barrel steels for the metallurgy division of the Army ordnance, stationed at the bureau of standards, Washington; metallurgist for Remington Union Metallic Cartridge Co., and metallurgical engineer with General Motors Research Corp., Dayton, O. Later he was transferred to Detroit, and rose to his present position. Mr. Boegehold is author of numerous articles relating to the foundry field, and is an active member of the American Foundrymen's association, American Society for Metals, American Society for Testing Materials, and the Society of Automotive Engineers; serving on various committees of those organizations.

♦ ♦ ♦

FRANK A. TRUEL, formerly general manager, Herzog Iron Works, foundry division, St. Paul, Minn., now is president and general manager of his own foundry, the Truel Foundry Co., St. Paul, which is located on the site of the old Midway Foundry Co. Mr. Truel is a graduate of the McLain system, and has been superintendent of Municipal Foundries Inc., West Allis, Wis., superintendent of Neenah Foundry Co., Neenah, Wis., superintendent of the Lakeside Foundry, Milwaukee, Wis., general superintendent of York Foundry & Machine Co., York, Pa., general superintendent of Belle City Iron Works, Racine, Wis., and general manager of the Midway Foundry Co., St. Paul Minn.

♦ ♦ ♦

WILLIAM H. RUTEN recently was appointed an instructor in the department of mechanical engineering, University of Nebraska, Lincoln, Nebr., where he will handle courses in woodworking and pattern making. He succeeds Prof. Albert E. Bunting who retired recently after 31 years with that department. Mr. Ruten received his public school training at the high school of Quincy, Ill., and was graduated from the University of Michigan, Ann Arbor, Mich., with degrees in bachelor of science and master of arts. His practical experience includes 3 years as an apprentice pattern maker with the Quincy Pattern Co., Quincy, Ill., and 10 years as a journeyman pattern maker, two years as foreman of a large pattern making department. While a student at the University of Michigan he worked as part time pattern maker and draftsman for the Economy Baler Co. During the past summer he has been employed in the foundry division of the Ford Motor Co., Detroit. Mr. Ruten spent 5 years teaching woodwork and pattern making at the Fordson Technical high school, Dearborn, Mich., and 3 years as instructor in foundry practice at the Manual Training high school, Indianapolis. He is a member of the American Foundrymen's association, Society for the Promotion of Engineering Education, the National Education association, the Indiana Industrial Education association and has been active on the apprenticeship training committee of the A. F. A.

♦ ♦ ♦

IRA F. CHENEY, superintendent, Detroit plant, Griffin Wheel Co., recently was elected chairman of the Detroit chapter of the A.F.A. Mr. Cheney started work as an inspector with the Griffin Wheel Co. at the Detroit plant on Oct. 20, 1918. He spent 7 years in the inspection department then was transferred to the foundry and appointed foreman on June 15, 1925. Two years later he was made general foreman and on Sept. 1, 1929 he was appointed superintendent of the Detroit plant.

♦ ♦ ♦

W. E. JONES, formerly foundry engineer, with J. M. Tull Metal & Supply Co., Atlanta, Ga., southeastern representative for the International Nickel Co., has become metallurgist, Stockham Pipe Fittings Co., Birmingham, Ala.

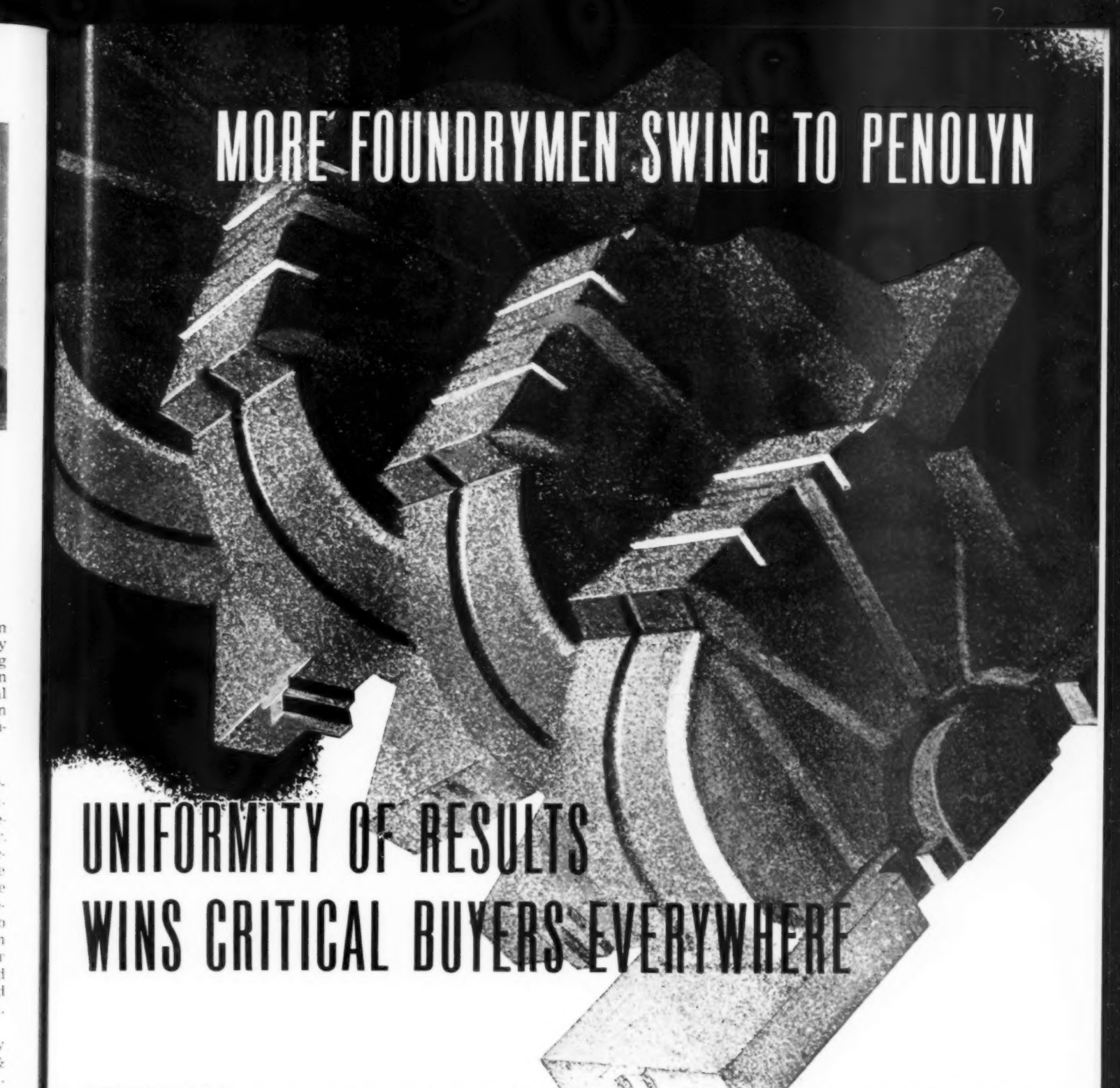
♦ ♦ ♦

E. C. MCLEAN, formerly connected with the R. O. Collins Iron Works, Tallahassee, Fla., has become an owner and general manager of the T. J. Barnett Foundry & Engineering Co., Palatka, Fla. The name of the company has been changed to the Barnett Iron Works.

♦ ♦ ♦

EDWIN M. SHERWOOD has been appointed to an Ohio State University-Battelle fellowship in metalurgy according to Clyde E. Williams, director of Battelle Memorial institute.

(*Concluded on page* 42)



# MORE FOUNDRYMEN SWING TO PENOLYN

## UNIFORMITY OF RESULTS WINS CRITICAL BUYERS EVERYWHERE

FOUNDRYMEN pouring cast iron, steel, malleable, aluminum, brass and other non-ferrous castings have learned to rely on Penolyn Core Oil for the consistent and dependable uniformity of the work it produces.

Penolyn has won remarkable success because it delivers what all foundrymen want: better workability, greater binding strength, minimum gas and faster cleanout. And in so doing, assures as well closer control, fewer rejects, greater speed and better castings.

Exacting tests made by leading foundries now using Penolyn have proved these points of superiority. Let Penola's foundry engineers tell you about them, and recommend proper grade of Penolyn for any type of casting. Prove Penolyn's quality for yourself. You'll see why it is the choice of critical buyers everywhere.

**PENOLA INC.**

PITTSBURGH, PA. (Formerly Pennsylvania Lubricating Co.)

NEW YORK • CHICAGO • DETROIT • ST. LOUIS

(*Concluded from page* 40)

The fellowship is a part of the institute's work in the field of research education. Mr. Sherwood is to make a study of the austenite-ferrite transformation in stainless steels and related alloys, applying electron defraction and x-ray technique. He is a graduate of Ohio State university and received his master of science degree in physics from there in 1935.

• • •

A. R. CLARK, for the past 21 years shops superintendent at the Ensley and Fairfield, Ala., plants of the Tennessee Coal, Iron & Railroad Co., retired from active duty Oct. 1 on account of ill health. Before joining the Alabama company Jan. 1, 1907, he was connected at varying

A. R. Clark

periods with the Lackawanna Steel Co., Buffalo; Dominion Iron & Steel Co., Sydney, Nova Scotia; Illinois Steel Co., Chicago; and the Newport News Shipbuilding & Drydock Co., Newport News, Va.

• • •

V. J. HYDAR, for many years director of employment, Falk Corp., Milwaukee, has resigned to become senior field representative of the federal committee on apprentice training. Mr. Hydar is a native of St. Louis. After completing the high school course at Ironwood, Mich., he entered Marquette university, Milwaukee, and was graduated in 1926 with the degree of mechanical engineer. Mr. Hydar has been connected with the Falk Corp. since 1922, starting as a co-operative engineering apprentice. On graduating from Marquette university he was made assistant in the apprentice department, and in 1932 he was given charge of the personnel department. Mr. Hydar is well known for his writings in the industrial press, especially on the subject of apprentice training. He is a member of the Industrial Relations Association of Wisconsin and the American Society of Mechanical Engineers. In his new work, Mr. Hydar will contact employer and labor groups to promote adoption of national standards of apprenticeship in the metal trades industries.

• • •

JENS INGEBRETSEN, foundry superintendent, Otis Elevator Co., Yonkers, N. Y. retired Oct. 1 after 49 years service with the company. He entered the employ of Otis Brothers & Co., predecessors of the present company in 1882 as an apprentice in the foundry and was advanced in succession to the position of molder, foreman, superintendent and general foundry superintendent of the company which operates foundries in Yonkers, N. Y., Buffalo, Harrison, N. J., Quincy, Ill., and Boston.

• • •

GEORGE G. BENNETT recently has been appointed foundry foreman of Long Beach Iron Works, Long Beach, Calif. He has had molding and coremaking experience with Bilton Machine Tool Co., Bridgeport, Conn., Sullivan Machinery Co., Claremont, N. H., and in jobbing shops near Boston. From 1923 until 1937 he was connected with Jones & Laughlin Steel Corp., Pittsburgh, first as iron molder, then for 6 years as iron foundry foreman, and for 7 years was assistant to the superintendent of foundries. In 1937 he became associated with Warman Steel Casting Co., Los Angeles, Calif., as assistant superintendent. Mr. Bennett is a graduate of Wentworth institute, Boston, and also has taken evening courses at Carnegie Institute of Technology, Pittsburgh.

• • •

FRED V. GARDNER has been elected acting treasurer, Chain Belt Co., Milwaukee. He succeeds the late C. L. Pfeifer. Associated with the company since early this year in a consulting capacity, Mr. Gardner formerly was affiliated with General Electric Co., Schenectady, N. Y., as supervisor of budgets.

F. V. Gardner

JOHN T. BROWN, vice president has been named to the board of directors; G. M. Dyke, assistant treasurer, has been re-elected to that post, and A. F. Kessler, chief accountant, has been made an assistant treasurer.

• • •

C. RAYMOND MESSENGER, president, Chain Belt Co., Milwaukee, and chairman of the board, Oliver Farm Equipment Co., Chicago, has been elected a member of the Yale University alumni board.

## National Founders Will Meet

Annual meeting of the National Founders association will be held in the Waldorf-Astoria hotel, New York, Wednesday and Thursday, Nov. 16 and 17. The program will be devoted to present problems in industrial relations. Frank R. Hoadley, Atwood Machine Co., Stonington, Conn., is president.

## Is Representative

Scientific Supplies Co., 123 Jackson street, Seattle, has been appointed representative of the Despatch Oven Co., Minneapolis, in the states of Washington, Oregon, Idaho, and Montana.

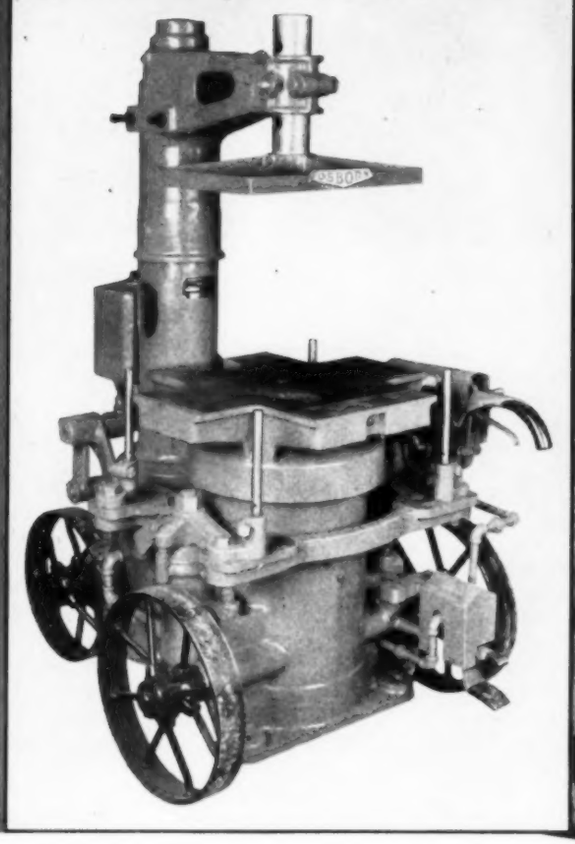
## Made Distributors

General Refractories Co., 1600 Real Estate Trust building, Philadelphia, has appointed the following distributors: Slip Not Belting Co., Kingsport, Tenn.; Fleck Co., Camden, N. J.; New England Brick Co., Boston; and Lusco Brick & Stone Co., Kansas City.

## Issues Bulletin

Bureau of labor statistics, United States department of labor, recently has issued bulletin No. 634 entitled "Characteristics of Company Unions 1935." The study is divided into three parts: Part I deals with the historical background of company union organization, part II describes the extent and characteristics of company unions, and part III deals with the organization and functioning of 126 company unions. This study describes organizations which were in operation in May 1935. It does not reflect the extensive changes in methods of employer-employe relations which have taken place under the national labor relations act.

# SUCCESSFUL PERFORMANCE OF THE 7012 EXTENDED TO LARGER SIZES



● Popular acceptance of the No. 7012 Osborn Jolt Squeeze Stripper invites the development of a larger machine of the same type to be announced soon.

No. 7012 with 12 inch squeeze cylinder covers the range of small and medium sizes of moulds from split patterns. The new machine with 14 in. squeeze cylinder will make available the same operating advantages for moulds of larger sizes.

Both machines are portable. Each is quickly adaptable to a wide scope of flask requirements in its respective range of mould sizes. Both machines are engineered for speed, accuracy, easy operation and dependable performance.

Investigate the advantages of these machines as applied to YOUR operations. Complete details will be furnished promptly.

*THE OSBORN MANUFACTURING COMPANY*

5401 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.
*AGENCIES LOCATED STRATEGICALLY ALL OVER THE WORLD*

# TIME PROVES VALUES

OSBORN

# MOULDING MACHINES

H. P. Kreulen

B. C. Wait

Ralph L. Lee

William J. Grede

## Foundries Combine Sales Forces

The Liberty Foundry, Inc., Wauwatosa, Wis., established in 1917 and specializing in light gray iron castings, the Spring City Foundry Co., Waukesha, Wis., established in 1913 and producing castings for the internal combustion engine industry, and the Milwaukee Steel Foundry Co., Milwaukee, incorporated in 1903, and making commercial carbon and high alloy cast steel, have united their sales engineering forces. While no change will be made in the personnel of the three individual plants, the co-operative sales plan permits castings buyers to secure technical and production facilities of all three noncompetitive foundries through one channel. Research facilities also have been combined so that the technical knowledge and practical experience in modern metallurgical and foundry practice of each plant is available as a single service.

The combination of the sales activities of the three companies has been under the direction of Wm. J. Grede, president, the Liberty Foundry, Inc., president, Spring City Foundry Co., and chairman of the board, Milwaukee Steel Foundry Co. John W. Perry, Jr., who has been made general sales manager, became connected with the foundry industry several years ago as manager of sales of the Milwaukee Steel Foundry Co. Other members of the combined executive personnel, shown on this page are B. C. Wait, president, Milwaukee Steel Foundry Co., Arthur L. Grede, vice president, Milwaukee Steel Foundry Co., and secretary Spring City Foundry Co., H. P. Kreulen, vice president Spring City Foundry Co., Ralph L. Lee, secretary-treasurer, The Liberty Foundry Co., Inc. and general comptroller, O. E. Woehlke, superintendent, The Liberty Foundry, Inc. and James J. Ewens, superintendent, Milwaukee Steel Foundry Co.

## Publish Symposium

American Society for Testing Materials recently has made available the four technical papers comprising the "Symposium on Protecting Metals against Corrosion" which was presented at the spring meeting of the Detroit section. The papers include "Corrosion Resistant Alloys," by H. W. Gillett, Battelle Memorial institute; "Protection of Base Metals by the Use of Metallic Coatings" by C. E. Heussner, Chrysler Corp.; "The Pre-Treatment of Metals" by R. J. Wirshing, General Motors Corp., and "Corrosion Protection by Means of Organic Coatings" by J. L. McCloud, Ford Motor Co. Copies of the symposium may be obtained from the society, 260 South Broad street, Philadelphia, for 50 cents each.

## Power Requirements

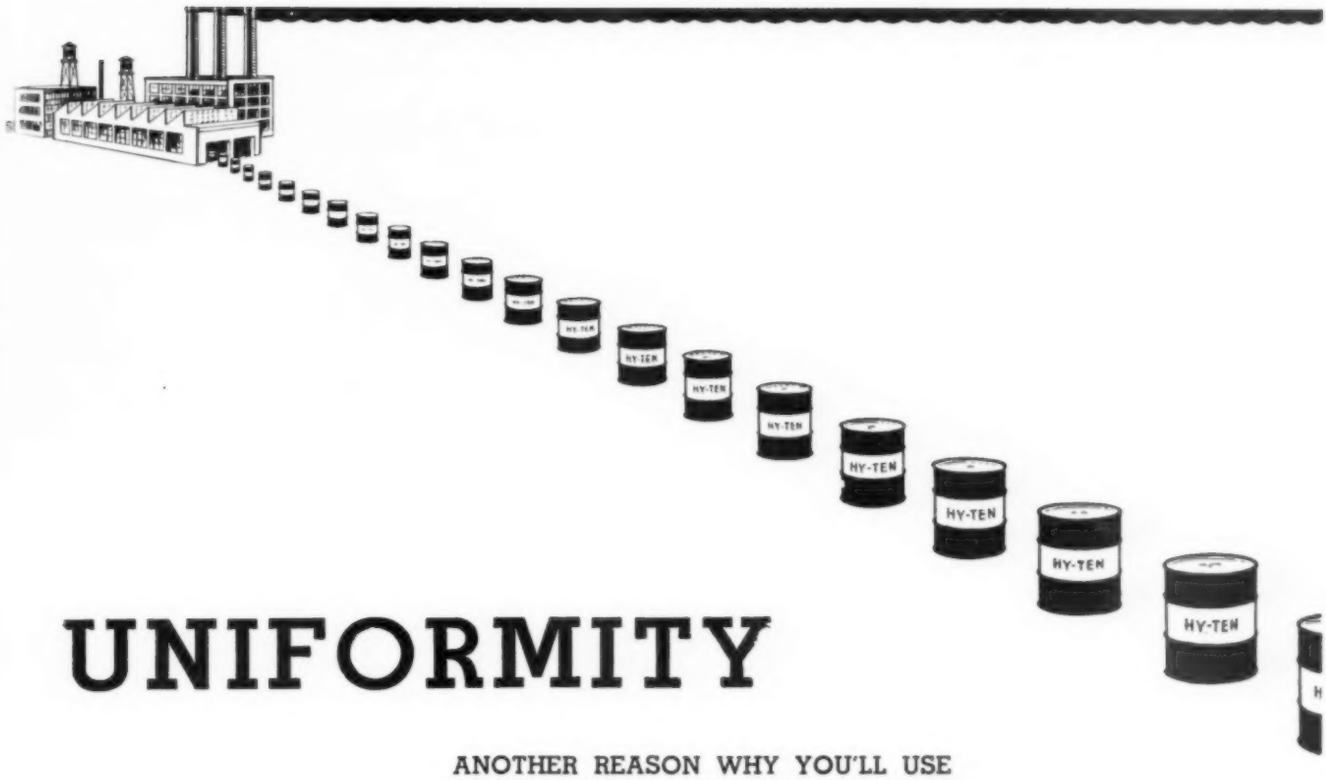
Federal Power commission, Washington recently has published a 125-page bulletin entitled "Power Requirements in Electrochemical, Electrometallurgical, and Allied Industries." It is divided into 14 sections giving information on power requirements and supply for production of aluminum, copper, zinc, magnesium, cadmium, chlorine and caustic soda, iron and steel, ferroalloys, and numerous other products electrically produced. Copies may be obtained from the Federal Power commission, Washington, for $1.00.

J. W. Perry Jr.

J. J. Ewens

Arthur L. Grede

O. E. Woehlke




# UNIFORMITY

**ANOTHER REASON WHY YOU'LL USE HY-TEN CORE OIL. ASIDE FROM HIGHER CORE STRENGTH, LESS GASSING, AND FINER SURFACE FINISH.**

Day after day, drum after drum, core after core, you can't tell one shipment of HY-TEN Core Oil from another. We know the stress the core-room lays on uniformity . . . and we stake our reputation and your business on that feature of HY-TEN.

To cite one case—a large manufacturer of precision instruments tested HY-TEN in its laboratory, found that it gave perhaps the best performance of any proprietory or staple oil tested. "But we tested a SAMPLE," their chemist declared, "so how do we know that each and every drum will do as well?"

So they bought five drums for production tests. The result: tensile strength of cores made from samples from each drum varied only four pounds from low to high. Transverse breaking strength varied only three pounds—all within a high range, and checking with the original test. The average of the five drums was only a decimal away from the test performance.

Since then that foundry has been buying five, ten and now twenty drums at a time, and turning out cores of which the pouring floor has never complained.

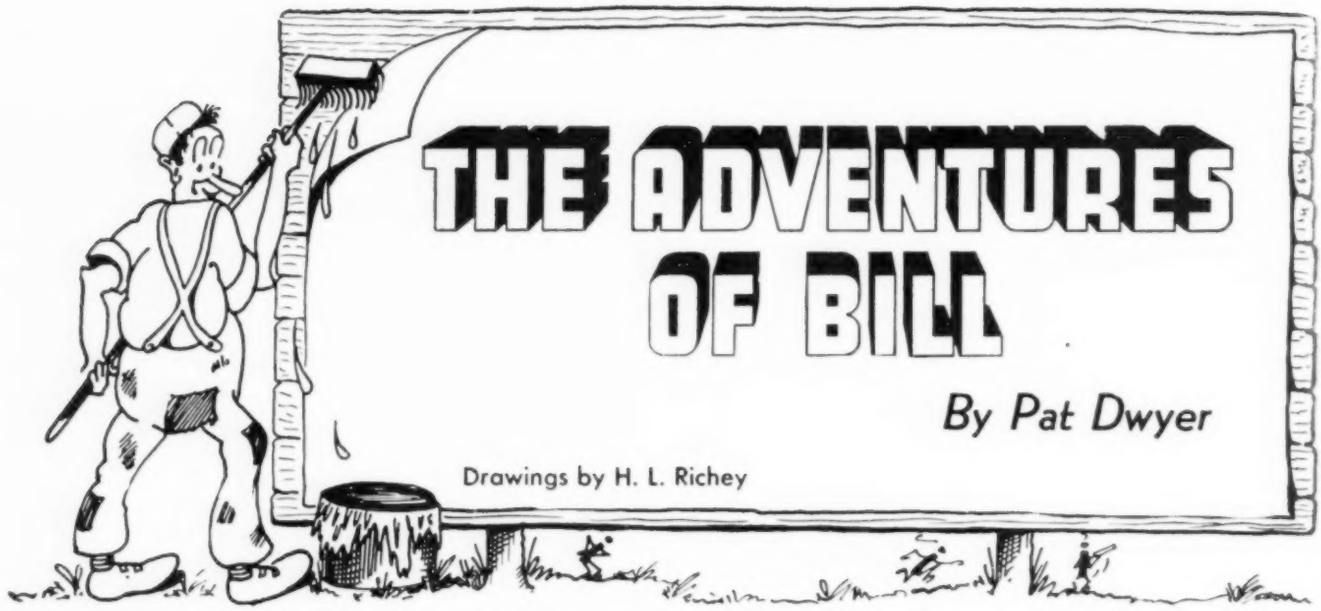
Small wonder that HY-TEN has taken the foundry trade by storm. There's a folder and a sample waiting for your core-room.

## E. F. HOUGHTON & CO.

Chicago - **PHILADELPHIA** - Detroit

Reg. U. S. Pat. Off.

**HY-TEN** *a proven Core Oil by Houghton*



# THE ADVENTURES OF BILL

By Pat Dwyer

Drawings by H. L. Richey

ONE of these days," I said to Bill, "I am going to stop reading the newspapers. 'Tis just a waste of time and like smoking a pipe is merely a useless habit that one acquires in the silly days of youth."

"Them there sure is right hefty sentiments, pard," Bill drawled in what he imagined was the true western dialect as spoken in the cinema. "I am inclined to string along with you on the newspaper proposition, but I see quite a sizable cause for alarm in your reference to the noble art of smoking a pipeful of tobacco. Newspapers, sure, drop 'em any time and you'll never miss 'em. Pipe smoking is something else again. It is about the only masculine accomplishment that has not been appropriated by the charming creatures who wear the funny hats. Hesitate, my dear young fellow, hesitate before you take the final plunge over the brink of a well ordered life.

"Reminds me of my uncle Bill. This was my uncle on my mother's side. We always called him Bill the Sailor because as a young lad he had done a hitch in the navy. We also called him Bill the Sailor to distinguish him from my uncle on my father's side Bill Blotto and two cousins Bill the Fiddler and Buffalo Bill. Well, anyway Bill the Sailor smoked a particularly poisonous brand of tobacco all through the year, with the exception of the holy season of Lent. On the stroke of twelve p.m.—midnight to you—Shrove Tuesday, he removed the pipe from his whiskered face and placed it behind the clock on the mantelpiece. There it remained until he snapped it up again about daylight Easter Sunday morning. As a result of this cruel and unusual mortification of the flesh his health was ruined. We buried him just a month before his 84th birthday.

"Talking about Bill the Sailor brings to mind a story with a maritime flavor which I heard while vacationing in Nova Scotia this past summer. Incidentally it supports your claim that reading newspapers is a waste of time. The name of an old time ship building and ship owning company came up in the conversation one day and started a flood of reminiscences.

"On one occasion the company placed an order with a ship building firm on the Clyde in Scotland for a steel cargo steamer. I do not remember the name of the firm, and what difference does it make anyway. You are not thinking of having a ship built, are you? Even if you were, all you have to do is pick up a list of names, close your eyes, say eeny - meeny - miney - mo while moving a pencil point over the names. The firm on whose name your pencil point comes to rest can build you anything in the shape of a sea going craft provided forbye ye hae the siller. Just another way of saying provided you can lay the jack on the line. Any phenagler who expects to leave these canny lads holding the bag must get up verra airly, airly in the morn' and then he probably will find himself either in the bag or in the jug."

The beginning of 40 days misery

"Why all this beating about the bush? You'll have barnacles on the hull before you get the engines into her."

"Ca' canny, lad. Ca' canny. A big cargo boat is not built over night. Oh, yes I can remember the war days when they knocked 'em out one a day at Hog Island shipyard on the Delaware, but that was something else again. Building one ship to a special set of specifications, and building several hundred to a standard pattern does not offer a base on which to draw comparisons. A master sculptor, diploma in hand and medals on his chest, may take a month to sculp an artistic trifle, first in clay, then in plaster and then in a metal mold. The mold then is taken to the slush mold foundry, where any man with a pair of hands steady and strong enough to lift a dipper of metal, and a pair of feet that will support him for 8 hours, can whack out enough duplicates in the same length of time to enable the 5 and 10 stores to sell them at a profit."

"The great war is a long time past and one's memory is apt to play

(*Continued on page* 49)

PAGES REMOVED

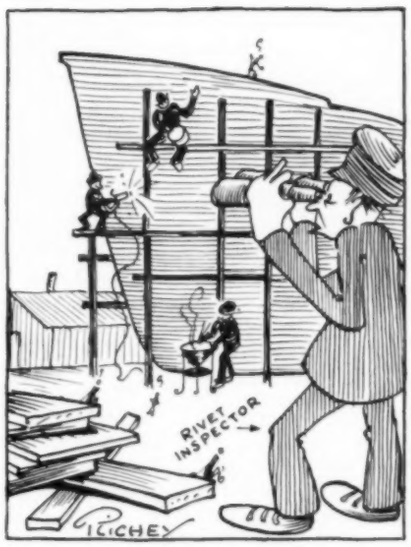
tricks, but it seems to me that the government did not realize much of a profit on the emergency fleet even though all kinds of records were smashed into small splinters in the production."

"No," Bill admitted, "The government did not make any money on that deal, but even if any money had been made or saved, we the people would not have benefited. Some potent member of the official wigwam, one of the big chiefs we trustingly send to Washington to look after our interests, would have spilled the loot down another rat hole. If certain friends happened to be loafing in the neighborhood during the pouring period and if, let us say just for the sake of the argument, these friends happened to have a few buckets, or maybe a wash tub or two, why, ha-ha, you know how it is. Just one of those remarkable coincidences you read about all the time in the papers.

"However, this brief digression into the field of political economy, intensely interesting of course and —ah—highly instructive and all that kind of stuff, has nothing at all to do with how the good ship MIC-MAC was christened, or how Captain Dick Meikle fought a good fight with the powers of the press—and lost.

"As senior captain of the fleet of vessels operated by the company, with unlimited ticket in sail and steam, any ocean, any tonnage, Captain Dick was sent to Scotland to supervise the construction of the new vessel and to take command after she was launched. He was the owners' representative, Johnny on the spot, to see that every plate was in its place, every rivet socked home tight and that the engines were bolted down in a manner that would prevent them from jumping overboard in a heavy sea. Properly and legitimately proud of its reputation as a ship builder the construction company could have finished the job to meet Lloyd's *A* 1 rating, without any outside supervision or inspection, but that did not prevent the captain from keeping a sharp eye on every detail from the laying of the keel to the application of the last dab of paint. If he was going to take her out on her maiden voyage and remain in command indefinitely thereafter, then by the hoary old locks of Neptune, she was going to be all she ought to be, and a little more.

"The owners decided to call the new vessel MIC-MAC in delicate tribute to the Mic-mac tribe of Indians, original inhabitants of Nova Scotia and an offshoot of the great Algonquin tribe which for centuries before the coming of the white man had inhabited that section




**He feels safer at a distance**

of North America now included in the North New England states and the Maritime provinces of Canada. In recent years only a few pitiful remnants remained here and there on reservations, but that does not alter the fact that they are descendants of the real first families and therefore worthy of recognition —before they fade out of the picture altogether.

"Launching a vessel on the Clyde attracts slightly less attention than a dog fight. It is all in the day's work. Some of the newspapers may give the event a paragraph in the marine news on one of the inside pages. In this case a roving reporter happened to be in the vicinity and by rare good fortune found the captain in a rather talkative mood. Among other things he learned that most of the people in Nova Scotia are of Irish and Scottish descent. Touching on the name of the vessel he was told she was called after an Indian tribe, the Mic-macs, original inhabitants of the country.

"Little Johnny Bright Eyes was a writer, but of a certainty he was not in the class of great writers of whom Scotland justly is proud. As with many reporters on this side, lacking a cultural background and wide general knowledge, his stories occasionally were garbled to a remarkable extent. His private life may have been above reproach and in all probability he was good to his mother, but in so far as setting facts down accurately was concerned he was just about as reliable as Handy Andy. The captain's eyes popped and his moustache curled up at the ends when he read the following in the morning paper:

Yesterday at the hour of 10 a.m. in the yards of Tilliegorum & Co., Ltd., a brawny workman knocked away the retaining blocks and another one in the long list of vessels built by that firm slid gracefully down the "ways" and had her first dip into her future home on the "briny deep". In an interesting chat with her "Skipper" Captain R. Miggle, Ye Scribe learned many things about Nova Scotia (New Scotland), one of our North American colonies and part of His Most Gracious Majesty's loyal Dominion of Canada. The vessel was built to the order of a Nova Scotia shipping firm and "Thereby hangs a tale".

Bands of wild Indians still roam the savannahs and prairies in the interior of the colony where they hunt the bison, the yak and the reindeer with primitive bow and spear. They are a proud and independent people and look "askance" at the white man and his ways. Periodically they visit the trading posts and exchange the "pelts" of various fur bearing animals for bright hued blankets, axes, knives, glass beads and trinkets known in the peculiar "Patois" spoken by Indian and white man alike as "Gewgaws". The captain was at a loss

(*Concluded on page* 96)

**Question is will he be cold with the kilt or kilt with the cold**

## Ontario

OFFICERS of the newly formed Ontario Chapter of the A. F. A. are: Chairman Joseph Sully, Sully Brass Foundry, Ltd., Toronto; vice-chairman D. J. MacDonald, Dominion Radiator & Boiler Co., Ltd., Toronto, and secretary-treasurer S. R. Francis, Metals & Alloys Ltd., Toronto. Directors include W. R. Barnes, W. R. Barnes & Co., Toronto; Charles Ley, Dominion Wheel & Foundries Ltd., Toronto; D. M. Storie, Fittings Ltd., Oshawa; C. C. MacDonald, Frederick B. Stevens of Canada Ltd., Toronto; O. W. Ellis, Ontario Research foundation, Toronto; N. B. Clarke, Steel Co. of Canada, Toronto; D. Cameron, John T. Hepburn Ltd., Toronto; J. J. McFayden, Galt Malleable Iron Co. Ltd., Galt, and Major L. L. Anthes, Anthes Foundry Ltd., Toronto. Membership committee consists of C. C. MacDonald, chairman and W. R. Barnes, vice-chairman. O. W. Ellis is chairman of the program committee.

Over 100 members and guests attended the first meeting of the Ontario chapter held at the Rock Garden lodge, Hamilton, on Sept. 30. Chairman Sully opened the meeting by reading messages of congratulation from the National headquarters, and from several other sources.

L. P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland, and chairman of the Northeastern Ohio chapter, was the speaker of the evening. According to Mr. Robinson nine important factors enter into core room operation, and they must be controlled properly if the best results are to be obtained. These include: Proper selection of core sands, proper selection of binders, use of cereal binders, proper ratios, proper mixing, moisture control, baking, venting, and proper inspection.

He said there is one proper sand for every core job, and the right sand permits use of the best possible sand to binder ratio, the cores clean out better, and sticking in the boxes is eliminated. No single binder provides the answer to all problems in core manufacture. Ratios of sand to binder should be established accurately, and that condition maintained in the shop.

Mr. Robinson stated that the best mixing is obtained with paddle or muller type mixers although other methods may have to be employed in some instances. There is an optimum time of mixing for a sand mixture, and that should be observed carefully. High moisture content in the sand will cause trouble in the core room. Cores should be baked under closely controlled temperature conditions, and every oven should be equipped with some type of accurate temperature indicator, and if possible the temperature should be recorded. The core should be vented properly, and attention given in the foundry to see that the vents are taken out through the mold. Proper inspection will eliminate all faulty and imperfect cores.

An interesting event of the evening was a complete display of air brake core assemblies supplied through the courtesy of Canadian Westinghouse Co., Hamilton. Those were set up under the direction of John Reed, factory superintendent, and proved of considerable interest to all those present.—*Joseph Sully, chairman.*

## Reading

REGULAR meeting of the Reading Foundrymen's association, Reading, Pa., held in the Wyomissing club, Tuesday, Sept. 20 was well attended with 22 members present. Music was provided by the Tennessee Serenaders during dinner.

Under reports of Committees, President Greenstreet commended the members for their splendid efforts in securing 14 new members during the summer months. The names of all the new company memberships were read, and were highly praised for joining the association.

The speaker for the evening was Dr. T. Holland Nelson, consulting metallurgist, who gave a fine talk on the various effects of metals during the freezing stages. Dr. Nelson's family was in the steel business for several generations, and his talk gave some very good points to those present on how steel is produced. His talk was illustrated with slides. The speaker explained thoroughly many features of steel ingot production, and how it can apply to other metals as well.

The entertainment committee received many congratulations on the fine manner in which the first annual picnic and golf tournament was conducted, and it was suggested that in the very near future another get-together be held.—*H. C. Cummings, secretary.*

## Quad City

FIRST meeting of the Quad City Chapter of the A. F. A. for the 1938-39 season was held at the LeClaire hotel, Moline, Ill., on Sept. 19, with 110 members and guests in attendance. H. A. Deane, Deere & Co., and vice chairman of the chapter presided. Arthur E. Hageboeck, Frank Foundries Corp., called attention of the members to the Iowa City Conference. Jack Hogeboeck, a baritone singer at radio station WOC, Davenport, sang several songs.

Main speaker at the meeting was Don J. Reese, research engineer, International Nickel Co., New York, who talked on "Producing Quality Gray Iron with a Cupola." He discussed equipment available for melting iron for castings, and gave a complete description of cupola construction, blowers, and methods for the successful operation of them. Mention of the various jobs that could be handled and what steps are necessary to have success also were given. Many concrete problems of industry to illustrate his points were used to bring out clearly what actually happens in various cases in melting of iron. Composition of

(*Continued on page* 52)

# *Figuring Foundry Costs*

Every defective casting adds to the net cost of the good castings. Too many defectives put casting costs so high that profits or customers disappear.

Ajax Seven Point Ingots keep casting costs low because they make "defectives" few and far between.

It's all in the Ajax Refining Process.

## Ajax Standards

Ajax Plastic Bronze
Ajax Manganese Bronze
Ajax Hydraulic Bronze
Ajax Phosphor Bronze
Ajax Anti Acid Bronze
Ajax Pressure Bronze
Ajax Red Brass
Ajax Golden Glow
Yellow Brass
Ajax Aluminum Bronze
Ajax Aluminum Alloys
Ajax Nickel Alloys
Ajax Tombasil Bronze
Ajax Phosphor Copper
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Ajax Silicon Copper
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Brass, Bronze, Nickel and Aluminum Alloys produced to all formulae.

## THE AJAX METAL COMPANY

*Established* 1880

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*ASSOCIATE COMPANIES*

**Ajax Electrothermic Corporation**
Ajax-Northrup Induction Furnaces for melting and localized heating and hardening.

**Ajax Electric Furnace Corporation**
Ajax-Wyatt Induction Furnaces for melting.

**Ajax Electric Co. Inc.**
Ajax-Hultgren Salt Bath Furnace and Resistance Type Electric Furnaces for all heat treating operations.

(*Continued from page* 50)

charges, cupola charging, and the melting process itself were discussed by the speaker.

Moisture in the cupola blast was described in reference to the melts along with the blast and how the installation can be made of such equipment with satisfaction to the firm. Many accessories of the melting of iron were explained with due consideration given to the construction of various parts of the cupola, types of ladles, etc., that have proven to be satisfactory for melting purposes for large and small foundries. At the conclusion of his talk, Mr. Reese replied to numerous questions from the audience.—*J. Morgan Johnson, secretary-treasurer*

## Chicago

LARGEST party ever held by the Chicago chapter, American Foundrymen's association, featured an attendance of close to 800 at the annual stag outing and golf party, Sept. 24 at Lincolnshire country club, Crete, Ill. Events included all-day golf, horseshoes and other sports. An afternoon feature was a softball game between two local girls' teams. In the evening some 720 chicken dinners were served in the tent adjoining the clubhouse. Door, golf and horseshoe prizes were awarded and a particularly interesting floor show was presented.

At the first fall meeting of the chapter, held Oct. 10 at the Medinah club, Chicago, members and guests were made welcome by L. H. Rudesill, Griffin Wheel Co., chairman of the Chicago chapter, who also announced the joint conference held by the chapter and Purdue university at West Lafayette, Ind., Oct. 27-29. The chapter is also sponsoring a bigger and better lecture series for this season to be held at Peoples Gas building auditorium. In addition to this, the foundry exhibit at the Rosenwald industrial museum is being completed and the chapter will hold its April 10 meeting there.

New officers of the American Foundrymen's association were presented to the chapter, following which John Abbott, Hickman-Williams Co., chairman of the entertainment committee, revealed some startling statistics in regard to the recent stag outing and golf party, giving his committee full credit for the success of the affair. After a financial report by C. C. Kawin, Chas. C. Kawin Co., treasurer of the chapter, L. H. Rudesill pointed out that this season the chapter will try to present at its monthly meeting speakers whose subject matter will appeal more to the group as a whole instead of only to small and diversified sections.

Dr. Walter H. C. Laves, associate professor of political science, University of Chicago, was the speaker of the evening and introduced some new angles on the current European situation. In a 45-minute address Dr. Laves traced the development of events from the Versailles treaty up to the recent 4-power Munich conference.

At the conclusion of his talk, the floor raised the question of trade prospects with the Latin-American countries. Dr. Laves declined to pass his own opinion on this subject, but stated that colleagues who said they were economists saw prospects of increased trade in that direction not very bright, due in part to the intensive cultivation of South American trade by the European nations, which has been going on for some time past.—*J. F. Powell.*

## New England

REGULAR monthly meeting of the New England Foundrymen's association comprised a joint session with the Employers' Association of Eastern Massachusetts and the Boston branch of the Metal Trades association. Meeting and dinner were held at the Boston Chamber of Commerce on Oct. 5, and about 150 members and guests

(*Continued on page* 54)

**Largest party ever held by the Chicago Chapter featured an attendance of 800 members and guests**

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Easily installed on present equipment
A vibrator that hits hard, is not choked or dampened, one Herman vibrator does the work of two or more of other types.
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MOLDING **HERMAN** MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

(*Continued from page* 52)

of the several organizations were present. The speaker was C. Wayland Brooks, Chicago, whose topic was, "America Wants To Know." He related an interesting story of present day conditions, and where we are headed. Following the talk, many present took part in a question period.—*M. A. Hosmer, correspondent.*

## Buffalo

ABOUT 70 members of the Buffalo chapter of the A. F. A. heard two exceptionally interesting addresses at the regular monthly meeting Oct. 3 in King Arthur's restaurant, 199 Delaware avenue, under the chairmanship of M. W. Pohlman, Pohlman Foundry Co., Inc. The first address by W. G. Soley, patent attorney, Carborundum Co., Niagara Falls, N. Y., was based on the speaker's collection of bizarre and in many instances startling copies of patent specifications issued by the department at Washington over a period of many years to inventors chiefly concerned with the production of gadgets with no practical application. Illustrations on the screen supplemented by running psuedo-scientific and mock serious scholarly comment provided humorous and at times hilarious entertainment for the audience.

In the second address also illustrated by a number of slides, Pat Dwyer, engineering editor THE FOUNDRY, Cleveland, discussed the function and application of gates and risers to various types of castings. In many instances, the speaker claimed, the size, shape and position of the gate is a factor of comparatively little importance. Any opening that will permit metal to enter the mold will serve satisfactorily. In other instances the gate is the most important feature in the construction of the mold. Drawing on a wide practical experience he referred in considerable detail to the gating practice on many classes of castings in support of his contentions. Touching on the subject of skim and strainer gates he said that in some instances they defeat their own object on account of being too elaborate. The ideal gate is one which provides the shortest passage between the runner basin and the mold cavity. He favored top pouring wherever the method came inside practical conditions. Theoretically a casting should solidify progressively from the bottom to the top. Conversely, shrinkage is influenced by the law of gravity. Top pouring is in harmony with both of these natural laws.

Outside members of the A. F. A. attending the meeting included J. E. Riffer, St. Catherines Brass Foundry, St. Catherine, Ont., and S. R. Francis, Metals & Alloys, Ltd., Toronto, secretary of the Ontario chapter, A. F. A., Toronto, Ont.—*J. R. Wark, secretary.*

## Syracuse

SYRACUSE Foundrymen's association held a noon luncheon on Oct. 11. E. H. Patterson, Mohawk & Utica Casualty Co., presented an informal talk in which he described a few of the aspects of the recent insurance laws as they pertain to the foundry industry. The meeting was well attended, and the discussion period following the talk was lively and pertinent.—*H. H. Judson.*

## Birmingham

BIRMINGHAM District Chapter of the A.F.A. held its annual barbecue Saturday, Sept. 17, at Pine view beach. This outing was one of the best yet held by the local chapter with 350 members and friends

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**Candid shots of speakers at and other participants in the second Fall Technical conference held at University of Michigan, Sept. 15, 16 and 17. Illustrations courtesy of Dr. Richa d (Dick) Schneidewind, University of Michigan**

Members and guests of the Birmingham Chapter go to an old-time southern barbecue

(*Continued from page* 54)

gathering on the beautiful grounds of the lake for an all-day jubilee.

At 9:00 a.m. the day was started off with members taking part in a softball game. The feature of this game was the umpiring of Col. Karl Langrebe of the Tennessee Coal, Iron & Railroad Co. After his demonstration of what a good umpire should be, the group will not need to visit a vaudeville show in the near future.

Soon after the softball game the overflow crowd took to the grand old game of horse-shoe pitching and no doubt champions in the rough were discovered. Bowling and volleyball took the attention of many of the guests. Although swimming season was over Dr. J. T. McKenzie of Acipco braved the icy water of the lake and came out smiling.

At noon an old-fashioned barbecue of southern chicken, spareribs and all the trimmings was served to the gathering.

Many of the chapter's friends were guests at this outing and the fine fellowship shown no doubt repaid them for their visit. About 40 foundries and supply houses had representatives at the outing among whom were: L. N. Shannon, director of the A.F.A.; Russell Hunt, Sloss-Sheffield Steel & Iron Co.; Bob Working, and Wade Oldham, Republic Steel Corp.; W. A. Berg, Woodward Iron Co.; Gordon Jones, U. S. Pipe & Foundry Co., Bessemer, Ala.; R. C. Stobert, Hardie Tynes Mfg. Co., Charles Hamilton, and Frank Hamilton, Alabama Pipe Co., Carson Adams, and Ed Rowe, Adams, Rowe & Norman Coal & Coke Co.; William Oberhelman, Hill & Griffith Co.; R. R. Deas Jr., past chairman of local chapter, and many others.—*R. C. Harrell, vice chairman.*

## Northern California

THE Northern California chapter of the A. F. A. held its first fall meeting with a record attendance of regulars, and several new members and visitors.

Charles J. B. Hoehn, Enterprise Foundry Co., San Francisco, and a director of the A. F. A., was given a place of honor on the announcement program. Mr. Hoehn reported on such matters of A. F. A. interest as do not regularly get to the lay members, one point being that members of the Northwest have hinted there will soon be a baby in the A. F. A. chapter family. When the blessed event happens, the Northern California chapter hopes the association's traveling ball bearing baby rattle will be on hand to add to the glamour.

John Fenstermacher, Columbia Steel Co., San Francisco, and chairman of the Northern California chapter mentioned a recent visit of Hyman Bornstein to the West coast and expressed the hope that the 1940 A. F. A. convention would be held in San Francisco. As a slight deviation from the general line of entertainment, the program provided a talk on the proposed single tax for California. The main feature was "Flow," a Crane Co. masterpiece on foundry operations shown in talkie form. The enthusiasm shown thus far indicates the Northern California chapter is going places this year.—*George L. Kennard, secretary.*

## Pittsburgh

THE second of two meetings devoted to general foundry technology by the Pittsburgh Foundrymen's association was held Oct. 17 in Hotel Fort Pitt, Pittsburgh. Subject of the meeting was establishment and control of sand standards and the speaker was August Rossetti, metallurgist, G. H. R. Foundry Co., Dayton, O. As an added feature, the J. S. McCormick Co., Pitts-

burgh, had in operation a complete line of sand testing equipment. Otto Nadolny, Duquesne Pattern & Bronze Co., Pittsburgh, and president, Pittsburgh Foundrymen's association was chairman of the meeting.

Mr. Rosetti was formerly chemist at Trafford foundry, Westinghouse Electric & Mfg. Co., Trafford, Pa., and at that time did considerable work on local sands. The problem of molding sand from a control standpoint was discussed. Keeping graphs of fineness or other qualities makes it possible to show just where the troublesome sand differs from an ideal sand by superimposing one graph upon the other. Graphs will also show up the moisture content. Care must be taken to control the type and quantity of green bond so that the best results may be obtained.

Effects of various clays in the sand system were described by the speaker. Close control of the amounts of clay in the system enables the foundry to determine the cause of the misbehaving of the sand. Constant screen tests aid in controlling durability of the sand. As the grain size changes durability disappears. Action of the iron breaks down the sand. Hence, close check must be kept to insure constant performance.

Examples of readings taken hourly on various jobs were shown demonstrating how the sand varies in use from the ideal standards. When this variation begins to show up, it is a simple matter to correct it to the desired standard before castings begin to be affected. Discussion on the paper was led by J. H. Johnston, Trafford foundry, Westinghouse Electric & Mfg. Co., and vice president, Pittsburgh Foundrymen's association.—*R. L. Hartford.*

## Southern California

MORE than 80 members and guests attended the Sept. 29 meeting of the Southern California chapter which was held at the Clark Hotel, Los Angeles. J. G. Coffman, chairman of the chapter presided, and presented Robert Gregg, retiring chairman with an A. F. A. signet ring as a token of appreciation by the chapter for his splendid work in organizing the chapter and its continuing success. He also announced the appointment of the various committees to serve during the coming year.

Robert Gregg, Reliance Regulator Corp., and chairman of the education & apprentice training committee, reported that arrangements were being made to have a foundry apprentice training course meeting one or two evenings a week at the Frank Wiggins Trade school. W. F. Haggman, Foundry Specialties Co., and chairman of the entertainment committee, announced that the foundry picnic was a financial success. E. F. Green, Axelson Mfg. Co., chairman of the membership committee, and G. W. Merrefield, Kay Brunner Steel Products, and chairman of the program committee also presented reports.

Following the presentatioin of reports the meeting was opened for a discussion on foundry equipment in which Ernest C. Heyde, plant engineer, Washington Eljer Co., Los Angeles, presented a talk on sandslingers and their operation. Alfred A. Grant, Grant & Co., local representative of the American Foundry Equipment Co., Mishawaka, Ind., discussed cleaning room equipment and centrifugal blast cleaning equipment. George W. Effinger, Snyder Foundry Supply Co., and local representative of National Engineering Co., Chicago, talked on sand mulling and handling equipment. The talks were illustrated by motion pictures and lantern slides. Fred A. Maurer, General Electric Co., Ontario, Calif., led the discussion in which a large number participated. —*M. S. Robb, secretary*

## Northeastern Ohio

NEARLY 300 members and guests of the Northeastern Ohio chapter attended the second regular meeting on Oct. 13 which consisted of a visitation to the Republic Steel Corp., Cleveland, to see the firm's new, continuous strip mill in operation. From the strip mill the group was taken to the Corrigan-McKinney division to visit the blast furnaces while one was making a cast, the pig machine, the ore docks, and the coke plant.

Following the visitation the group adjourned to the cafeteria of the Republic Steel Corp. where an excellent dinner was enjoyed. The meeting closed with a sound motion picture showing the production, fabrication and applications of stainless steel.—*Edwin Bremer.*

## Northern Illinois

GEORGE S. EVANS, Mathieson Alkali Works, Inc., New York, was the principal speaker at the Sept. 13 meeting of the Northern Illinois and Southern Wisconsin Chapter of the A. F. A., held at the Faust hotel, Rockford, Ill. Mr. Evans spoke on "Refining Cast Iron" with illustrations of the covered teapot mixer refining ladles and forehearth equipment. The speaker opened the discussion by briefly mentioning the field embraced by the refining of cast iron, and differentiating between refining and desulphurizing. He then gave a short history of desulphurizing, and the development of purite followed by a discussion of the development of the continuous process and early experiment in the cupola.

Action of soda ash at the cupola temperatures and chemical reactions and effects were taken up. The speaker then discussed the subject of ladle additions, describing the types, methods of handling, and results to be obtained. Finally, the effect of soda ash on the physical properties of iron, and the practical value of refining were presented.—*John T. Clausen, chairman.*

## New Jersey

G. W. HANNAY, secretary and assistant treasurer, Barnett Foundry & Machine Co., Irvington, N. J. has been elected president of the New Jersey Foundrymen's association, to succeed W. P. Laytham, Wm. P. Laythan & Sons Co., Paterson, N. J. This was announced at the Association's first fall meeting at the Downtown Club, Newark, N. J., Monday evening, October 10. Wm. H. Mantz, Atlas Foundry Co., Irvington, N. J., was elected vice president, to succeed Mr. Hannay, while J. A. Williamson, Isbel-Porter Co., Newark, N. J., was re-elected treasurer. John L. Carter will continue as secretary.

The meeting marked the beginning of the organization's thirty-second year, with approximately 100 present. The feature address was presented by R. K. Glass, metallurgist, Republic Steel Corp., Buffalo, entitled "Casting Defects: Causes and Remedies." Mr. Glass classified defective gray cast iron into three distinct groups: (1) Castings that cannot be repaired or salvaged; (2) castings that can be salvaged by chipping, but at extra cost; and (3) castings which are defective due to improper metal structure.

The speaker emphasized that these three classifications apply only to gray iron, because malleable and steel castings have additional specific defects, characteristic of their different behavior during solidification in the mold. He pointed out that there are 10 major operations in the production of a casting and that each one includes at least five separate contributing factors making either for a good or defective casting. These factors, at least 50 in all, should be subject to close control, he said.

Illustrating his remarks with numerous lantern slides, the speaker devoted particular attention to questions of sand mixtures, melting procedure and design. Discussing sand, he said that low permeability, lack of dry strength in green sand work and too much moisture, are perhaps the most frequent offenders in the average foundry. Each of these lie at the bottom of

(*Concluded on page* 60)

# Strength!

STERLING Flasks have MAXIMUM STRENGTH with MINIMUM WEIGHT. All steel — all welded — no rivets . . . this construction spells STRENGTH. Solid rolled center ribs — flanges of full width bearing — rolled steel sections . . . these features always mean MAXIMUM STRENGTH.

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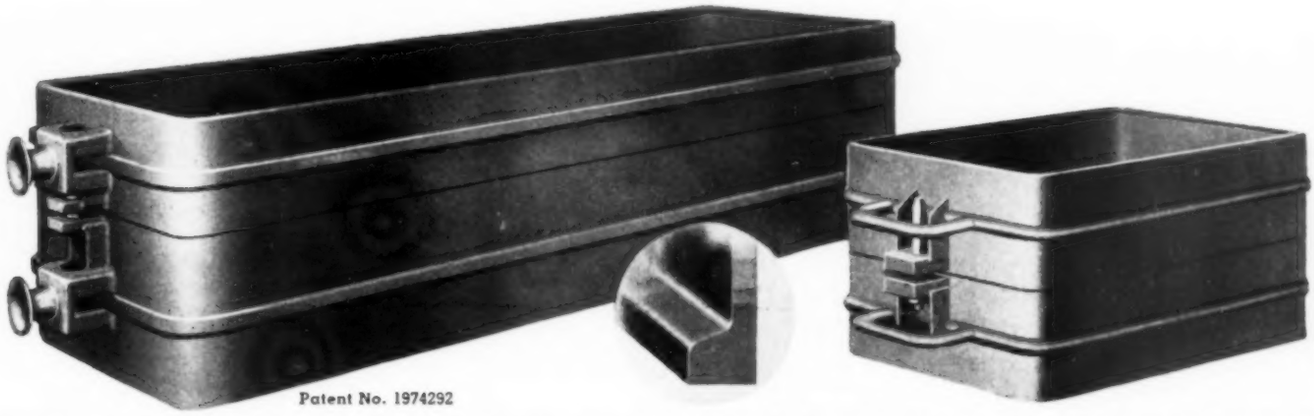

Patent No. 1974292

## STERLING WHEELBARROW COMPANY

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(*Concluded from page 58*)

a whole family of casting defects, he said, many of which are usually attributed to other causes, such as molding or pouring or some other procedure not actually to blame.

The speaker declared that during the past 10 years the tendency is to acquire higher cupola temperatures and that hotter metal demands high refractoriness in sands. He also discussed machining problems, asserting that much difficulty is not infrequently due to improper machining practice rather than to faulty castings. He did not place too much emphasis on molding practice as a source of trouble in the production of castings.—*Ben K. Price.*

## Metropolitan

MORE than 50 were present at the first fall meeting of the Metropolitan N. Y.-N. J. chapter of the American Foundrymen's association at the Essex house, Newark, N. J., Monday evening, Oct. 3. Roy M. Allen, consulting metallurgist, Bloomfield, N. J., presented an address on "The Microstructure of Cast Iron in Relation to its Physical Properties". He illustrated his remarks with lantern slides.

In the absence of Don J. Reese, chairman of the chapter and affiliated with the International Nickel Co., New York, W. E. Day jr., vice chairman and associated with the Mack Mfg. Co., New Brunswick, N. J., presided. A dinner preceded the meeting.—*Ben K. Price.*

## Conn. Nonferrous

FIRST Fall meeting of the Connecticut Nonferrous Foundrymen's association was held at the New Haven Yacht club, New Haven, Conn. on Sept. 20. John Wasserlein, Yale & Towne Mfg. Co., Stamford, Conn., spoke on "Continuous Nonferrous Molding." He described the system which is used at his plant, and its advantages in production. He also stressed the point of "by-pass gating," describing the success with this method of gating, and urging others to give it more consideration. H. A. Phelps, Phelps Foundry Co., Ansonia, Conn., and president of the group presided.

Second meeting of the association was held on Oct. 11 at the Indian Hill Country club, New Britain, Conn., with a golf tournament in the afternoon, and a dinner and a technical meeting at night. President Phelps presided, and the meeting was marked with a large attendance. Weather was ideal for golf and the prizes donated by Walter J. Kenney, North & Judd Mfg. Co., New Britain, were won by C. H. Blanchard, Reading Pratt & Cady division, American Chain & Cable Co., Hartford, Howard Gillis, Ansonia, and Louis G. Tarantino, Bridgeport. Speaker of the evening was T. Joseph Judge, Jenkins Bros. Co., Bridgeport, who spoke on "A Common Nonferrous Problem." The subject was concerned with the problem of incipient shrinkage and the speaker displayed several examples to illustrate his talk. Following Mr. Judge's talk an interesting discussion took place. It was the consensus of opinion that one of the corrective measures for the problem should be the raising of the cope to increase the pressure.—*Louis G. Tarantino, secretary.*

## N. Y. Foundrymen To Meet at Ithaca

The second regional foundry conference to be held Nov. 25 and 26 at Willard Straight hall, Cornell university, Ithaca, N. Y., is sponsored jointly by the Buffalo Chapter of the A. F. A.; Syracuse Foundrymen's association and Cornell university. Tentative program covers a wide range of interesting subjects including: Malleable iron, gates and risers, dust hazards, cupola practice, steel castings, sand control, elementary metallurgy and demonstration of metal crystallization. Detail program of subjects and speakers follows:

**Friday, Nov. 25**

MORNING

Registration, Willard Straight hall. All sessions in this building.

9:00 a.m. Open meeting address by Robert E. Kennedy, secretary, American Foundrymen's association and welcoming address by Dean S. C. Hollister, college of engineering, Cornell university.

9:30 a.m. *Malleable Iron.*
Chairman Ralph T. Rycroft, vice president, Jewell Alloy & Malleable Co., Buffalo.
Speaker, W. J. Diederichs, metallurgist, Autocar Co., Ardmore, Pa.

10:30 a.m. *Gates and Risers.*
Chairman, Willard Rother, metallurgist Buffalo Foundry & Machine Co., Buffalo.
Speaker, Pat Dwyer, engineering editor, THE FOUNDRY, Cleveland.

AFTERNOON

Luncheon. Address by Dexter S. Kimball, dean emeritus, college of engineering, Cornell university.

2:00 p.m. *Dust Hazards.*
Chairman Elliot Armstrong, Inter-Allied Foundries of New York State, Buffalo.
Speakers, Dr. Leonard Greenburg, executive director division of industrial Hygiene, state department of labor, New York.
E. O. Jones, director of safety and hygiene, American Foundrymen's association.

4:00 p.m. *Cupola Practice.*
Chairman, M. W. Pohlman, vice president Pohlman Foundry Co., Buffalo.
Speaker, Donald J. Reese, International Nickel Co., New York.

EVENING

Dinner, Willard Straight Hall.
Toastmaster, Marshall Post, President, American Foundrymen's association.
Speakers, J. A. Voss, director of public relations, Republic Steel Corp., Buffalo.
Dr. E. E. Day, President, Cornell university.

**Saturday Nov. 26**

MORNING

9:00 a.m. *Steel Castings.*
Chairman, T. H. Burke, Otis Elevator Co., Buffalo.
Speaker, K. V. Wheeler, Lebanon Steel Foundry Co., Lebanon, Pa.

10:30 a.m. *Practical Sand Control Problems.*
Chairman, Dr. H. Ries, Geology department, Cornell university.
Speaker, H. W. Dietert, President, H. W. Dietert Co., Detroit.

AFTERNOON

12:30 p.m. Luncheon.
Address by Lyman P. Wilson, Professor of law, Cornell university.

2:00 p.m. *Elementary Metallurgy.*
Chairman, H. H. Judson, foundry superintendent, Gould's Pumps, Inc., Seneca Falls, N. Y.
Speaker, H. C. Waldron, assistant foundry superintendent and metallurgist, Nordberg Mfg. Co., Milwaukee.
Demonstration of metal crystallization, Dr. C. W. Mason, chemistry department, Cornell university.

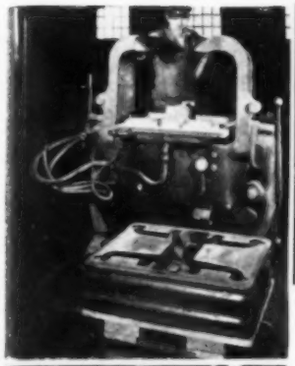
Henry B. Hanley, foundry manager American Laundry Machinery Co., Rochester, N. Y. is serving as chairman of the conference committee. Buffalo chapter of the American Foundrymen's association is represented on the committee by M. W. Pohlman, vice president Pohlman Foundry Co., Inc., and R. K. Glass, Metallurgist, Republic Steel Corp., Syracuse Foundrymen's association is represented by H. H. Judson, foundry superintendent Gould's Pumps, Inc., Seneca Falls, N. Y., and J. L. Lonergan, assistant to vice president Morris Machine Works, Baldwinsville, N. Y. Professor A. C. Davis, department experimental engineering, Sibley School of Mechanical Engineering represents Cornell university on the committee.

## Supplies Show Gain

Establishments engaged in the manufacture of foundry supplies reported a moderate increase in employment and a considerable increase in value of product for 1937 as compared with 1935, according to preliminary figures compiled from returns of the recent biannual census of manufacturers, released by director William E. Austin, bureau of census, department of commerce, Washington.

The number of wage earners employed in that industry increased 16.5 per cent from 1935 to 1937 and the wages increased 32.9 per cent. Value of products made in the industry in 1937 amounted to $8,625,707, a gain of 32.3 per cent over $6,519,166 reported in 1935.

Federated Metals division, American Smelting & Refining Co., Chicago, has removed its offices and plant to 123rd and Indianapolis boulevard, Whiting, Ind.



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## MOLDING MACHINE CO.

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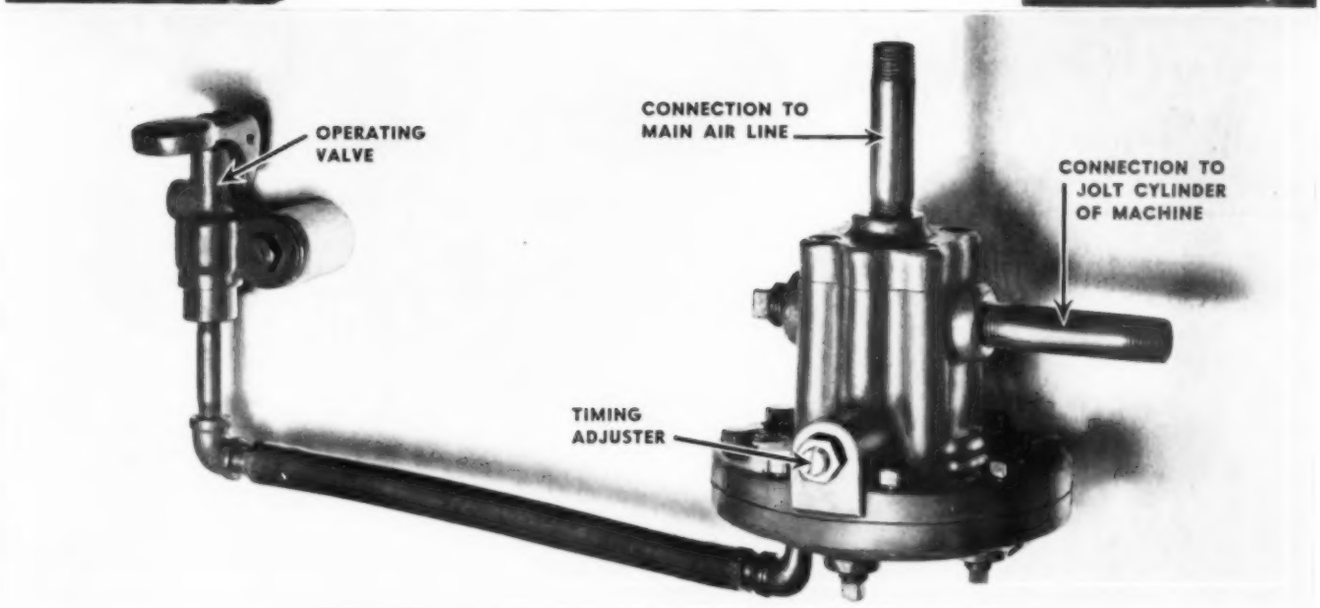

Foundrymen throughout the Southwest gathered at the second annual Foundry conference held at Missouri School of Mines & Metallurgy, Rolla, Mo.

# Rolla Conference Interests Southwestern Foundrymen

AN EXCELLENT program which featured the second annual Foundry Conference was held Oct. 7 and 8 at Rolla, Mo., under the sponsorship of the St. Louis District Chapter of the A. F. A. and the Missouri School of Mines and Metallurgy. An attendance of approximately 150 provided representation from a large number of plants throughout the southwest.

Through the co-operation of the St. Louis Chapter and the A. F. A., a special program was provided for all students at the School of Mines and Metallurgy on Friday morning. C. R. Culling, Carondelet Foundry Co., and president of the Gray Iron Founders' society discussed the steel and gray iron foundry industry, dealing with history, size, present day developments and application of steel and gray iron castings. Mr. Culling also outlined the research program of the Gray Iron Founders' society.

James H. Lansing, shop practice engineer, Malleable Founders' society, Cleveland, discussed the importance of malleable iron castings in the industrial field. Mr. Lansing illustrated his talk with a large number of slides showing a wide variety of malleable applications in the automotive, railroad, and miscellaneous fields. In addition to this special meeting, many of the students attended the various regular sessions of the conference.

The first technical session was devoted to a discussion of cupola practice, with George W. Mitsch, American Car & Foundry Co., St. Louis, as chairman. M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., presented an interesting paper "Mechanical Charging with Cupola Control, as Practiced at the Caterpillar Tractor Co." Mr. Gregory described and illustrated the capacity and facilities of the Caterpillar plant, and discussed the method of handling the raw materials from the receiving yard through the cupola.

### Use Two Base Irons

He explained that some ten different specifications of cast iron are required for different types of castings and these different specifications are made from two base irons. The changes are made by ladle additions of various alloys and graphite, and are added through funnels at the spout. The metal is tapped into a receiving ladle at a temperature of 2840 to 2900 degrees Fahr. Careful attention is given to the control of temperatures and optical pyrometer readings are made every 15 minutes. A portion of this discussion appears in two articles by Mr. Gregory which appeared in the June and July 1938 issues of THE FOUNDRY.

A practical discussion of the various factors which must be taken into consideration in the operation of the cupola as a melting furnace featured the paper "Cupola Practice" presented by A. O. Nilles, Griffin Wheel Co., Kansas City, Kans. The speaker pointed out that in the standard cupolas used by his company, the tapping hole is sufficiently high to permit a 6 to 8-inch sand bottom, which is made up partially of new molding sand and topped off with an inch or two of burnt molding sand from the foundry. After the bed coke has been charged, oil burners are used in lighting. The bed then is brought to a height of approximately 42 inches above the tuyeres and the cupola is charged. Special care is taken in controlling the silicon and manganese content and in the coke used so that proper control of the combined carbon in the castings may be secured.

Mr. Nilles stated that in recent months considerable research has been undertaken with a $CO_2$ gas determinator which will eliminate guess work for the cupola operator in adjusting blast volume. It was stated that in the type of work being produced, experience has shown that metal tapped at 2700 degrees Fahr. and poured at 2425 to 2450 degrees Fahr. is not controlled as easily as metal leaving the cupola spout at 2600 degrees and poured at about 2400 degrees. Records are taken at definite intervals with optical pyrometers and the readings are recorded with other data covering the regular operation.

J. O. Klein, Southern Malleable Iron Co., E. St. Louis, Ill., and chairman of the St. Louis District Chap-

(*Continued on page* 65)

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# MILWAUKEE MOLDERS

## *Complete Line . . . . All Types and Sizes*

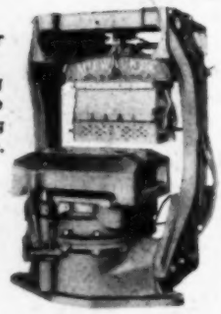
**No. 103 Jolt Squeezer,** stationary type with 10"squeezing piston. No. 104 portable type, also available.

**No. 124 Jolt Squeezer,** portable type with 12"squeezing piston. No. 123 stationary type, also available.

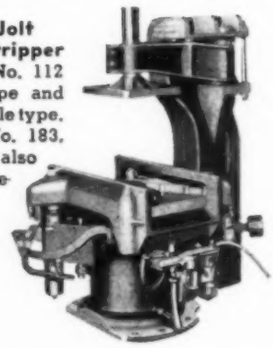
**No. 131 Jolt Squeezer,** with 13" squeezing piston. No. 181 size with 18" squeezing piston, also available.

**No. 143 Jolt Squeezing Stripper** with 14" squeezing piston. No. 163 size with 16" squeezing piston, also available.

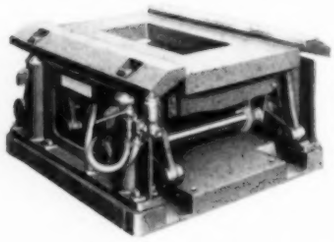
**No. 214 Jolt Squeezing Stripper Mold Lift-Off** with 21" squeezing piston. No. 244 size with 24" squeezing piston, also available.



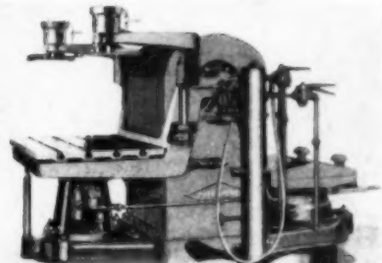
**No. 142 Jolt Squeezing Stripper** 14" piston. No. 112 stationary type and No. 113 portable type. 11" piston. No. 183, 18" piston, also available



**No. 70 Core Grinder** with 30" grinding wheel and 70" table. Speed of table, 2 to 5 r. p. m.



**Power Strippers** — 20" wide x 40" long to 50" wide x 72" long. 6" to 14" pattern draw.



**Davenport Jolt Roll-Over Draw**—22"width, 10" draw to 54" width, 24" draw. 750 to 10,000 lbs. capacity.

Every Milwaukee Molder is a fast, high production unit, easy to operate and ruggedly constructed for years of hard service. They enable you to produce quality castings at low cost.

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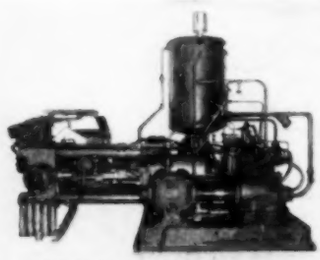

**No. 330 Briquetting Press** — briquettes cast iron borings and crushed steel turnings. Capacity 2 to 3 tons per hour. Automatic hydraulic operation.

**Davenport Plain Jolts**

12"x12" to 72"x96" tables, 200 lbs. to 16,000 lbs. lifting capacity.

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(*Continued from page 62*)

er, presided over a combination session devoted to nonferrous and malleable practices. The first paper "Choosing and Using Nonferrous Alloys" by J. W. Kelin, Federated Metal division, American Smelting & Refining Co., St. Louis, featured three factors which must be taken into consideration. The first relates to physical requirements such as tensile strength, percentage of elongation, brinell hardness, and possibly electrical or thermal conductivity. The second deals with machining qualities, especially where careful machining and delicate tool finishing are required to complete an exacting casting job. The third consideration deals with the cost of the alloy, since competition compels the use of the most economical composition that will meet the necessary metallurgical and physical requirements. Mr. Kelin presented tables giving the physical properties of red brass, gun metal, high lead bronze, bearing bronze, manganese bronze, aluminum bronze and yellow brass.

### Causes of Casting Defects

The second portion of the paper was devoted to a discussion of nonferrous casting defects. The speaker pointed out that frequently an unsound or inferior casting is the result of a number of causes rather than any specific mishandling. Therefore it is necessary to check the following factors in determining possible causes of defects: Alloy, melting and pouring temperature, flux, molding practice, sand, and cores. Correct melting and pouring should be determined with the use of accurate pyrometers. Mr. Kelin also presented a table showing some of the causes and suggested remedies for porous castings, black spots, rough surfaces, cold spots, hard spots and high melting losses.

The second paper, entitled "Malleable Iron Castings—Manufacture, Properties and Uses" was presented by L. J. Wise, Chicago Malleable Castings Co., Chicago. After showing a number of slides illustrating the application of malleable castings, Mr. Wise discussed the history of the industry, described the manufacture and then considered the properties which may be obtained. The speaker pointed out that about half of the total malleable iron production is used by the automotive industry and that the remainder of castings produced are employed in agricultural implements, railroad equipment and for a wide variety of miscellaneous uses which include pipe fittings, lawn mower parts, stadium seat brackets, washing machine parts, lamp brackets, bridge railing, etc.

The third paper at this session was presented by Hyman Bornstein, Deere & Company, Moline, Ill., on "Short Cycle Anneal." Mr. Bornstein pointed out that the metallurgical basis for shorter annealing periods for malleable cast iron had been known for many years. The long annealing cycle used in the usual periodic oven was due to limitations of equipment. Occasionally smaller ovens would be used or packing materials would be eliminated. Both schemes would result in cutting down the annealing cycle.

Development of the radiant tube furnace has given the malleable foundryman a tool with which he can obtain a much shorter anneal. A metal which would anneal in 7 days in the periodic oven, can be annealed in less than 60 hours in the radiant tube furnace.

Composition is important and affects annealing. Increase in silicon has marked effect on reducing time. On production runs in radiant tube furnace of metal of 1.00 per cent silicon was annealed in 52 hours, 1.20 per cent silicon in 30 hours and 1.75 per cent silicon in 14½ hours. This type of furnace permits the control of atmosphere and a definite atmosphere is introduced to prevent scaling and minimize decarburization.

The author described some of the experimental work done by his company during the past year. This included the determination of optimum cycles for various compositions, effect of silicon and annealing, effect of various furnace atmospheres and effect of various rates of heating to the maximum temperature.

### Organization Should Co-operate

Speaking at the luncheon meeting Friday noon on the subject "Safety in Foundries," J. Oliver Johnson, American Optical Co., St. Louis, emphasized the importance of having every member of the organization co-operating in the safety program. Not only must the entire executive staff back the safety work, but all must set a good example for the workers to follow. Mr. Johnson discussed the use of safety equipment and presented 21 classifications of accidents.

L. J. Desparois, Pickands-Mather & Co., St. Louis, chairman of the conference committee, opened the afternoon session and introduced William R. Chedsey, director, Missouri School of Mines and Metallurgy, Rolla, who welcomed the visiting foundrymen to the school. The session was devoted to discussions of sands and refractories, with L. C. Farquhar, American Steel Foundries, East St. Louis, Ill., as chairman.

Horace A. Deane, Deere & Co., Moline, Ill., presented an interesting discussion on "Molding Sand Problems in the Foundry." Mr. Deane emphasized the point that a considerable saving would result through using good sand and proper sand control. The speaker outlined the factors which must be considered in the selection of new sand, and discussed natural sands, synthetic sands, the handling of sand, and problems arising in the use of sand.

The following figures for heap sands were suggested: Castings weighing 1 to 100 pounds, moisture 5.5 to 6.5 per cent, permeability 18 to 40, strength 6 to 7.5 pounds; castings weighing 100 to 300 pounds, moisture 5.5 to 7.0 per cent, permeability 40 to 70, strength 6.5 to 7.5 pounds; castings weighing 300 to 1000 pounds, moisture 4.5 to 5.0 per cent, permeability 75 to 100, strength 7.5 to 8.5 pounds. Mr. Deane stated that the tendency is toward more open, weaker sand and harder ramming. In his opinion the driest, finest and weakest sand that will produce satisfactory castings is ideal. However, most production molders prefer the opposite. In general facings have a base of heap sand plus sea coal and any additional bond or opener sand required. It is best to have the permeability slightly lower and the strength higher than for backing sand.

### Demonstrated Testing Equipment

Harry W. Dietert, Harry W. Dietert Co., Detroit, discussed "Testing and Control of Molding Sands" and demonstrated the various types of sand testing equipment used in the laboratory. Mr. Dietert also passed around a large number of castings illustrating a wide variety of defects which result from improper conditions. The speaker stated that the object of testing sand is first to measure the sand for its physical properties and second to hold the sand to a predetermined set of physical values. In the foundry it is found profitable to control molding sand and cores to definite values in moisture, permeability, strength and grain fineness.

"Limitations of Foundry Refractories" was the subject of the final paper of the afternoon session, presented by M. C. Booze, Chas. Taylor Sons Co., Cincinnati. Mr. Booze stated that temperatures, rates of melting and refining, slag composition, and other factors must be held within the bounds of safety and economy relative to the furnace lining. Because of urgent demands for better refractories, more important developments have taken place in that field during the past decade than ever before. New types of products are available and great improvements have been made in the commonly used refractories.

The speaker discussed the various factors such as shrinkage, spalling, thermo-spalling, and slag erosion which affect the life of refractories. He presented valuable information on the properties of various types of refractories, and indicated the

improvements which may be secured in furnace life through design and manipulation.

The conference dinner was held at the Pennant hotel Friday evening with George S. Haley, Century Foundry, St. Louis, and past chairman of the St. Louis chapter as toastmaster. Members of the local committee were introduced and the greetings of the national office of the A. F. A. were presented by Robert E. Kennedy, secretary. Leroy P. Robinson, Werner G. Smith Co., Cleveland, presented a most interesting and at times revealing talk upon his research in the application of foundry production methods to his chicken farm in Michigan. Mr. Robinson was introduced by Frank G. Steinebach, editor, THE FOUNDRY, Cleveland.

### Describes Spectrograph Operation

The general subject of gray iron and metallography featured one session on Saturday morning under the chairmanship of C. R. Culling, Carondelet Foundry Co., St. Louis, and president of the Gray Iron Founders' society. S. R. B. Cook, professor, Missouri School of Mines, presented an interesting discussion on "Limitations of the Spectrograph" in which he outlined the history, principles and methods of operation of the spectrograph. Professor Cook presented in some detail both the arc and the spark methods of excitation, described the equipment needed for the spark method and discussed the preparation of samples. He pointed out that while sulphur carbon and nitrogen cannot be determined, the other constituents of gray cast iron can be found readily with the spectrograph and that considerable accuracy develops in determining the small percentages of the elements included.

In the second paper, Carl H. Morken, Carondelet Foundry Co., St. Louis, discussed "Practical Application of Metallography," Mr. Morken explained the mechanics of graphitization in the freezing of cast iron, indicating the various stages and temperatures in the process. He then discussed heat treatment in the various stages, which is in reality a means of controlling the cooling rate. He stated that between 800 and 1200 degrees Fahr., heat treatment provides stress relieving, while some softening takes place. Temperatures between 1200 and 1350 degrees Fahr. are not high enough for annealing but too high for stress relief and therefore should be avoided. The range between 1350 and 1650 degrees is the optimum for annealing operations. Above 1600 degrees Fahr. the breakdown in carbides is so rapid that it is disastrous except where this breakdown is desired, such as to obtain magnetic properties. Mr. Morken stressed the point that all annealing operations should be conducted with great care. An interesting discussion period followed this paper.

At the steel foundry session Saturday morning, Joseph D. Walsh, Scullin Steel Co., St. Louis, presented a paper on the subject of blowholes in steel castings. A second paper dealing with the manufacture of steel castings for oil refinery service was presented by L. E. Everett, foundry superintendent, Key Co., East St. Louis, Ill.

Mr. Walsh referred to 34 separate items responsible for blowholes in steel castings. These were grouped under the following general heads: Molds and cores sand, binders, rust, chills and chaplets. Each item was treated in considerable detail and attention was directed to the fact that in many instances workmen either through ignorance or carelessness produce molds that inevitably will blow when filled with molten steel.

Eternal vigilance and generous instruction on the part of the foreman are necessary to overcome this condition. The speaker claimed that the human element still is one of the most important to be considered in the production of castings. Selection of duly qualified men is just as important as the selection of proper material and equipment. The first human element in the foundry is the foreman who must be broad enough and clear enough of vision to keep in touch with progress and development.

### Casting Design Important

In a general summing up the speaker directed attention to the fact that in many instances the design of the casting is responsible for certain defects including blowholes. A casting filled with complicated cores presents a hazard in that suitable passages for the escape of gas cannot be provided. The designing engineer should be open minded enough to accept suggestions from the foundryman and if necessary change a design to facilitate production of the casting in the foundry.

The first part of the paper presented by L. E. Everett covered many phases of the oil industry and the magnitude to which it has attained in recent years, not only in America, but in many foreign countries. Steel castings employed in the industry in the majority of instances are exposed to extremely severe service conditions. Fittings are demanded to operate at temperatures up to 1050 degrees Fahr., and at pressures up to 2000 pounds per square inch. At the other extreme in the dewaxing of oils, fittings must withstand temperatures as low as minus 75 degrees Fahr. at the same pressures. In an extreme instance the speaker referred to a French plant for which his company had furnished fittings designed to operate at a temperature of 1250 degrees Fahr. and at a pressure of 5400 pounds per square inch.

The speaker claimed that the steel foundry has been so close to the metallurgical developments in the oil refining industry that most of the alloy steels for the purpose are cast as successfully as forged. Some of the newer alloys are available only as castings. In a variety of ways castings are more desirable for refinery service than forgings of similar composition.

Chemical analysis must be restricted to close limits. Thoroughly degasified metal minimizes appearance of pin points, gas pockets, etc. Pouring practice is extremely important. Fettling and cleaning practices must be set up and adhered to carefully. Most of the alloys are extremely susceptible to air hardening and may crack if subjected to intense localized heat. Heat treatment is of prime importance. Inspection of this class of castings is unusually minute and thorough.

### Presents Gate Formula

Size of gates on the castings is regulated to a predetermined cross sectional area to serve as a metering orifice. For example flanged fittings up to 1000 pounds in weight use a gate in which the cross sectional area in square inches is equal to 0.09 of the square root of the weight of the casting. Molds are made from a comparatively weak sand, 2.0 pounds green shear strength, 5 to 6 pounds green compression, and 40 pounds dry compression, moisture content 1.8 and 2.2 per cent and permeability 300 or more.

The program for the conference was prepared by a special committee under the chairmanship of L. J. Desparois, Pickands-Mather & Co., St. Louis. The committee was made up of the following: George S. Haley, Century Foundry Co.; George W. Mitsch, American Car & Foundry Co.; C. R. Culling, Carondelet Foundry Co.; Webb Kammerer, Midvale Mining and Manufacturing Co.; J. W. Kelin, Federated Metals Division, American Smelting and Refining Co.; G. E. Mellow, Liberty Foundry Co.; W. C. Bliss Scullin Steel Co.; J. O. Klein, Southern Malleable Iron Co.; R. K. Durkan, M. W. Warren Coke Co.

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United States department of labor has issued bulletin No. 658 entitled "P.W.A. and Industry, a Four Year Study of Regenerative Employment." This study attempts to measure the effect of public works projects upon employment in the industries which supply materials to government financed and initiated projects. It presents, in tabular and graphic form, the findings of the bureau of labor statistics.

# Reader's Comment

EDITOR'S NOTE—*Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

## Sequence

TO THE EDITORS:

While the article in the October issue of THE FOUNDRY on the subject of brass foundry cores, page 84, fully acknowledges that there is a difference of opinion as to whether water should be added before or after the oil, it is observed that Mr. Patch is of the opinion that if the sand has been dried thoroughly, those who contend that the oil should be added before the water, are justified for the reasons given.

We, because of the nature of our business, are continuously carrying on experiments and although the writer personally until some 2 years ago, was of the similar opinion to Mr. Patch, I have since learned that by actual laboratory tests at our plant, added binding strength and more even distribution of oil can be obtained by applying the water before the oil.

There are two principal reasons for this added binding strength.

1. That the oil is more evenly distributed because of the coating of water already applied to the sand.

2. As there is a proportion of fines in all sands, it is these fines that focus the oil unless a previous application of water has been applied.

In the hundreds of laboratory tests we have made with most modern laboratory equipment, we have conclusively proved over and over again, that the application of materials to core mixtures should be—sand, water and then lastly the oil.

T. G. WAUGH
*President*
*Certified Core Oil & Mfg. Co.*
*Chicago*

## Use Vanadium

TO THE EDITORS:

We read in the September issue of THE FOUNDRY an item under "Questions and Answers" on page 36, concerning diesel engine cylinder liners. Of the various iron compositions indicated, we miss one carrying vanadium. You no doubt are aware that over here in Europe, successful use has been made of vanadium alloy iron for diesel liners, in the Scandinavian countries, England, and on the Continent.

We would like to mention that for 300 millimeter (12-inch) liners the most suitable iron has proved to be one containing about 3.30 per cent total carbon; 0.70 per cent silicon; 1.00 per cent manganese; 0.25 to 0.30 per cent phosphorus; 0.090 per cent sulphur maximum; 0.25 per cent vanadium, and 0.07 to 0.10 per cent titanium. Brinell hardness number will be in the range of 220 to 230.

May we add that for alloying purposes a number of the leading diesel engine makers in Europe avail themselves of Norwegian vanadium-titanium pig iron which is to be found in the market, both here and in the U.S.A.

J. H. ANDERSEN
*A/S Bremanger Kraftselskab*
*Bergen, Norway*

## Price Alone?

TO THE EDITORS:

Does the purchaser of gray iron castings buy his requirements from the standpoint of quality and service or does he place emphasis on price alone? Does the purchaser restrict his inquiries to those foundries familiar with the physical and chemical characteristics of gray iron so that his purchases enable savings because of higher quality built for his needs, or does he consider all foundries in one classification? Does the purchaser still believe all iron is *glass* or has he learned that higher tensile irons are a fact? Does the purchaser follow the industry enough to know that higher tensile irons built to meet his needs are more economical than the metals he receives in exchange for his willingness to pay only the "hammer prices"? Does the purchaser say, "I want this and that physical need. Can you supply it?" or does he say, "I will pay only two and one-quarter cents per pound delivered"? Does the more alert purchaser give the chemical specification without knowledge of varying conditions of the foundry dealt with; or, does he specify his physical needs with some indication of the chemical limitations within which he desires the foundry to work? We believe any foundryman covering a rather wide-spread territory can answer these questions without hesitation or qualification.

The Gray Iron Founders' society went to a good deal of trouble to establish a "Terms of Sales and Trade Customs" with and through the co-operation of the National Association of Purchasing Agents.

We think that every foundryman should familiarize himself with these and insist on adherence by the purchaser to the conditions set forth which are as fair to the purchaser as the seller and which are, in fact, very similar to the terms the purchaser's company has in its sales contracts. We think that every foundryman should realize he is operating one of the few industries that has not heretofore been allowed to name its own terms—terms the same purchaser will demand of the foundryman when selling him. The foundry must realize he is operating one of the basic industries of the world and is entitled to the same business courtesies the purchaser would demand were the positions reversed. Full realization of the importance of him to command the same respect that is accorded representatives of other basic industries.

Let us suggest that:

1. All foundrymen back the specifications and efforts of both the Gray Iron Founders' society and the American Foundrymen's association with moral if not monetary—monetary possibly being out of the question in some instances—support.

2. All foundrymen cease to sell their wares on the price basis, using instead a basis of quality and service—and then produce.

3. All foundrymen place their plant in a position to supply as great a variation of physical requirements as required by the purchasers. If they cannot fill the requirement, then recommend a fellow member rather than fail and drive work to competitive metals.

4. All foundrymen work toward the establishment of a scale of prices in much the same way as have the members of competitive industries, keeping in mind quality and workmanship of the highest calibre, for, anything less will continue to drive our customers to those competitive industries.

5. All foundrymen make a practice of recommending competitive though fellow member foundries, for check of prices on the quality-price ratio, or, in case the foundry is not in a position to supply the purchaser's needs, recommend a foundry that is a fellow member.

6. All foundrymen who contact the old time purchaser who is not or will not be posted on the quality-price ratio, allow those purchasers to buy their available *cheap* work against the time when the realization of this ratio comes to him through the advance of his competitors over him.

7. All foundrymen demand the respect for their place in the roll of basic industries, a recognition to which all are entitled.

It would seem if even only the majority of gray iron foundrymen worked along these lines, we need not fear the ever present chiseler who will only be listened to by the price hunter. The purchaser who places his business on price alone will not be a permanent or repeat customer and his tonnage, regard-

(*Concluded on page* 70)

"Now you listen to your Dad while he tells you how to wash that dirty face without ruining Mother's embroidered guest towels. Go into the bathroom, use plenty of soap and water, rub until you fairly shine, then rinse all the suds off with oodles of water before using the towel.

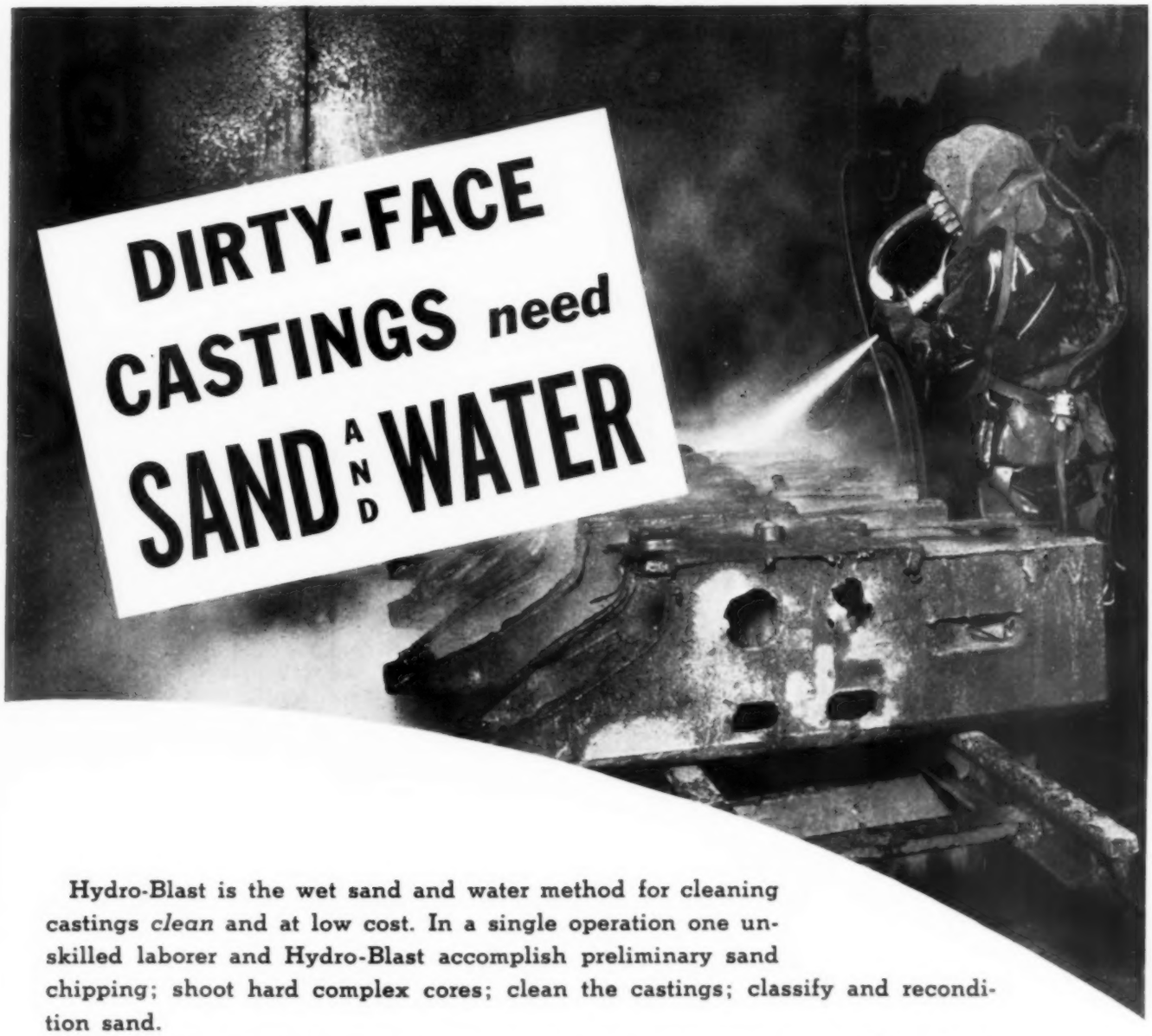
"Remember, none of that 'lick and promise' stuff goes if you want to visit the plant to see that new Hydro-Blast room where we handle preliminary chipping, shoot hard complex cores, clean castings and recondition sand; all in one operation.

"The last time I took you through our foundry you saw a lot of men operating pneumatic chippers. Many of our best men worked ceaselessly on that job, but they couldn't get the work absolutely clean and our customers complained. Invariably we'd leave small pieces of scale and fine sand particles because the castings were not thoroughly scoured with water.

"So we installed the Hydro-Blast to really clean the castings at low cost. The wet sand and water at 1,200 pounds pressure scours the castings absolutely clean and keeps our customers happy, just as lots of soap and water cleans your face and hands and keeps Mother in good humor."

***WET SAND AND WATER AT 1,200 POUNDS PRESSURE***

**HYDRO-BLAST Corp.**




Hydro-Blast is the wet sand and water method for cleaning castings *clean* and at low cost. In a single operation one unskilled laborer and Hydro-Blast accomplish preliminary sand chipping; shoot hard complex cores; clean the castings; classify and recondition sand.

Hydro-Blast, today's best investment in cleaning equipment, is equally facile in the large or small shop on a 50-pound or a 50-ton casting. It is flexibly engineered to meet the conditions as they exist and emergencies as they arise in steel, gray iron and brass foundries. Even shops of limited capacity desiring a cleaning room that will operate economically without creating dust, can secure a Hydro-Blast at surprisingly reasonable cost, and it will pay for itself out of savings.

Hydro-Blast is today's answer to the enforced economic demand for extreme efficiency in casting cleaning operations. So we ask you to ask yourself if it isn't false economy to struggle with casting cleaning problems when this proved wet sand and water cleaning method can be earning profits for you while paying for itself during the first year of operation.

**111 W. Washington St. CHICAGO ILLINOIS**

***Send for the latest Hydro-Blast Bulletin Number 105***

(*Concluded from page 67*)

less of what it may be, is not attractive to any foundry that chooses to advance. The purchaser who uses hammer prices controls a non-profit account and an annoying one as well.

WINONA MACHINE & FOUNDRY CO.
Winona, Min.

## Natural Sands

TO THE EDITORS:

The writer notes the article on page 36 of the October issue of THE FOUNDRY in regard to synthetic sand being used by steel foundries in the United States. We believe that your comment "no natural sand contains the proper proportions of silica sand and binder to serve satisfactorily" is a misstatement of facts.

There is in daily use today a naturally bonded steel molding sand which we produce at Dorchester, N. J. Steel foundries from Virginia north are using this sand for dry sand work and the material is exported to Nova Scotia and Canada as well.

It is also equally true that most of the green sand work in the same section is made in a sharp sand plus artificial binder mix. However, all of this sharp sand is not washed. Some of the New Jersey sands are pure enough in their raw state for steel molding. The only grain contamination is a priming coat of clay on the grain, the total clay content of the sand being approximately 1 per cent. This priming coat of clay makes it much easier to introduce either a clay or bentonite binder to the sand.

For years the naturally bonded steel sand referred to was used very generally along the Atlantic seaboard. With the introduction of synthetic sands its use declined due to the fact that closer control was maintained over sharp sand production than existed at that time in the naturally bonded sand. However, within the past year or so, improved methods of production, plus new equipment has resulted in close control in the production of these steel sands.

A. Y. GREGORY
*Sales Manager*
*Whitehead Brothers Co.*
*New York*

## On Again, Off Again

TO THE EDITOR:

An article in the August issue of THE FOUNDRY bears the title *Shows How to Prevent Accidents*. The illustration from the A.F.A. display at the recent American Foundrymen's association convention in Cleveland showed on the left or first panel, three rows of goggles. Caption under second row reads: "Broken by pieces of scrap metal and hot iron." I have seen the face of a fellow workman badly burned, but thanks to the goggles he was wearing, his eyes were not injured.

Two pages further along in the same issue I noted an illustrated advertisement for a pouring device. This device certainly looks good to a molder who was not always lucky enough to be working under the *big hook*, but had to shank his iron 50 feet or more down the main gangway to pour off his side floor. One of the good old customs responsible for the idea that all a molder needs is a strong back and a weak mind.

In the picture, the gentleman doing the pouring seems to be well taken care of from a safety standpoint. He has asbestos leggings, asbestos apron, asbestos gloves and presumably safety shoes. His feet do not show in the illustration. He also is equipped with a pair of goggles, supposedly furnished him to protect his eyes from glare, flying sparks and hot metal. From the manner in which he wears his glasses one might assume that the protection of his forehead is more important than the protection of his eyes. Something wrong here. Maybe Pat Dwyer or his friend Bill has the answer.

W. N. BECK
506 *West Penn Street*
*Butler, Pa.*

Editor's Note: An inquiry addressed to Bill brought the following laconic response: "If all the bimbos who refuse to follow orders were laid end to end the foundry would cease to be a headache and the gaffer could dispense—permanently—with about half of his vocabulary."

## Foundry Equipment Makers Meet

Fall meeting of the Foundry Equipment Manufacturers' association was held in Cleveland Friday, Oct. 21. In opening the meeting, H. S. Hersey, C. O. Bartlett & Snow Co., Cleveland, and president of the association outlined the purposes and objectives of the group and stressed the importance of co-operation and mutual understanding.

Earl Turner, Tuscany, Turner & Associates, Cleveland, presented an interesting discussion entitled, "Implications of Recent Labor Legislation." Mr. Turner's talk brought out a rather long discussion of the various phases of the fair labor standards act.

A report of business conditions indicated while business for the first six months of 1938 was considerably less than during the same period during 1937, some improvement has been noted during the past month or two.

Following the luncheon, short talks were made by John A. Penton, Penton Publishing Co., Cleveland; C. E. Hoyt, American Foundrymen's association, Chicago, and Frank H. Pelton, attorney, Cleveland. H. S. Simpson, National Engineering Co., Chicago, then presented motion pictures taken earlier in the year during his trip from Australia to San Francisco.

In the afternoon reports of various committees were presented. The subject of future foundry exhibits also was discussed.

## Safety Awards

Final report for the metals section safety contest sponsored by the National Safety council, 20 North Wacker drive, Chicago, and covering a period from July 1, 1937 to June 30, 1938, shows that the number of participants increased for the fifth consecutive year and reached a new high mark of 247. Number of hours worked amounted to 586,016,806, a decrease of 23 per cent from the total exposure for the 1936-1937 competition.

The average frequency rate was 7.701. This is 18 per cent below the rate for the preceding year. As in previous years the light machine shop division had the lowest rate, 4.463. Rates in other divisions ranged upward to 12.564 for foundries. Whether this should be accepted as representing the entire foundry industry is open to question, since according to the report only 42 foundry units were represented. These 42 foundries had 28,096,008 man-hours worked, 353 injuries to workmen, a frequency rate of 12.564. For purpose of classification the various metal working industries are listed under five main heads: Light machine shops *A* and *B;* steel mills *A* and *B;* rolling, fabricating and finishing *A* and *B;* heavy machine shops *A* and *B;* foundries *A* and *B*.

In foundry group *A*, No. 1 place is held by Auto Specialties Mfg. Co., Foundry division, St. Joseph, Mich., with a record of 1,080,443 man-hours worked, 3 injuries and a frequency rate of 2.777. Second and third place go to Union Carbide Co., Niagara Falls, N. Y., and the Otis Steel Co., Cleveland respectively.

In the group *B* foundries three plants are tied for first place, Haynes Stellite Co., Kokomo, Ind.; American Rolling Mill Co., Central Works, Middletown, O.; American Radiator Co., Michigan plant, Detroit, with records of 532,785; 214,345 and 139,229 man-hours respectively without an injury to any workman.

# A BETTER LIFTING MAGNET

## By a company which has specialized in magnetic equipment for 40 YEARS!

BUILT by magnetic experts—the Dings High Intensity Lifting Magnet brings a new maximum in lifting power, ruggedness, economy and long life.

For more than *40 years*, the entire resources of the Dings organization have been devoted exclusively to building better magnetic equipment.

The results of these years of experience, development and research are built into every inch of the Dings High Intensity Lifting Magnet. Here are just a few of its outstanding features of design which will cut your material handling costs to a new low:

**ANCHORED COIL**
Coil is bolted to body of magnet (a great percentage of magnet failures can be traced to movement of the coil)—*no other lifting magnet is built this way!*

**HEAVIER BODY**
Insures greater strength, and less risk of breakage.

**GREATER RADIATING SURFACE**
Large fins on body insure cooler operation, more power.

**HEAVIER OUTER POLE**
Smooth surfaces absorb shock, reduce risk of breakage.

**IMPROVED INNER POLE**
Extra heavy center pole attached to body by protected and locked bolts—can be removed without disturbing other parts.

**WATERPROOF COIL**
No moisture can get in to cause electrical trouble—coil is heavily impregnated under pressure.

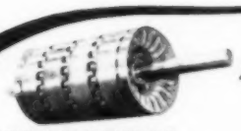
**MORE COIL SPACE**
More wire can be used—*lifting power is increased*—more pay load.

**DINGS MAGNETIC SEPARATOR CO.**
**675 Smith Street :: Milwaukee, Wis.**

*Write for Catalog!*

*A postcard request will bring you a 16 page catalog on the new Dings High Intensity Lifting Magnet. Send for it today!*

**Dings** High Intensity LIFTING MAGNETS



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Exclusive features of design make Dings Magnetic Separators the most powerful separators on the market, size for size. Bronze coil covers and individual coil spools with bronze spacers mean more pull . . . corrugated radial openings, longitudinal openings and heat radiating vanes mean cooler operation, more power. For better separation, specify Dings.

**MILL TYPE CLUTCHES**

Simple, rugged, tough—Dings Magnetic Clutches have solved the problems of remote control, safety synchronization, slippage and end thrust for the nation's leading steel mills.
Find out about them!

# Iowa Regional Conference Attracts Attention

THE third annual Iowa-Illinois regional foundry conference, held at Iowa City, Iowa, Oct. 14 and 15, attracted an attendance of approximately 200. The meeting was sponsored by the Quad City chapter of the A.F.A., the college of engineering, University of Iowa, the Northern Iowa Foundrymen's association, and the Northern Illinois-Southern Wisconsin chapter of the A.F.A. The general committee on arrangements consisted of Horace Deane, Deere & Co., Moline, Ill., chairman; H. F. Henninger, International Harvester Co., Rock Island, Ill.; T. J. Frank, Frank Foundries Corp., Davenport, Iowa; A. V. O'Brien, department of mechanical engineering, University of Iowa; John Clausen, Greenlee Bros. & Co., Rockford, Ill. and W. R. Jennings, John Deere Tractor Co., Waterloo, Iowa. A. E. Hageboeck, Frank Foundries Corp., Moline, Ill. was chairman of the attendance committee and F. O. Gorman, John Deere Spreader Works, East Moline, Ill. was chairman of the golf committee.

### Points To Core Room Troubles

The conference was opened on Friday morning by P. T. Bancroft, past chairman of the Quad City chapter of the A.F.A. Professor A. V. O'Brien extended the welcome of the university on behalf of the college of engineering. The first session, devoted to "Practical Sand Problems and Their Remedies" was under the chairmanship of R. Holland, International Harvester Co., Rock Island, Ill.

The first discussion, presented by L. P. Robinson, Werner G. Smith Co., Cleveland, featured "Some Common Sources of Core Room Trouble". Mr. Robinson presented the factors which must be taken into consideration in providing good core room practice, such as selection of core sands, selection of binders, proper ratios, proper mixing, moisture control, baking, improper venting and inspection. The speaker pointed out that unless all these factors are considered carefully in the light of the needs of the individual foundry, troubles in connection with cores causing defects in castings will continue. After the core is made it should be given a proper inspection. If a core is defected it should be thrown away. While inspections results in additional labor costs there is no doubt that the elimination of bad

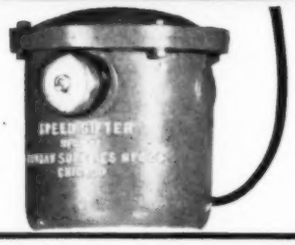
(*Concluded on page* 74)

**Annual Iowa-Illinois Regional conference held at Iowa City attracted a good attendance**

# *Increase Production*

*with the*

# ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



## ROTOPLANE SPEED SIFTER

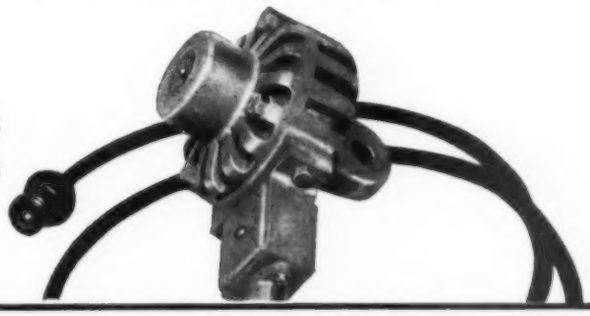
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged screen edges to tear workers' hands, no storage problem. *Ten Days Free Trial.*

**$175.00** f.o.b. Chicago—complete with cable, safety ground wire, new sieve (2 to 4 mesh). Standard ⅓ h.p. motor, 115 or 230 volt, 60 cycle, single phase.

*Order from Your Foundry Supply House*



## RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

**(All Prices f.o.b. Chicago)**

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| No. 1—Light match plate work | $10.00 |
| No. 2—Medium match plate work | 13.00 |
| No. 5—Heavy match plate, tub and bench work | 17.00 |
| No. 9—Machine and heavier work | 24.00 |

*Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.00 extra with Nos. 1, 2 and 5 vibrators.*

**KNEE SWITCHES for operating Red Electric Vibrators: Single pole $3.00, Double pole $4.00.**

**FOUNDRY SUPPLIES MFG. CO.**
2221 Orchard St. Chicago, Ill.

**CABLE ADDRESS: "ROTOPLANE CHICAGO"**

(*Concluded from page* 72)

cores will pay big dividends.

The second paper was presented by H. W. Dietert, Harry W. Dietert Co., Detroit, and dealt with "Curing Casting Defects Due to Sand". Mr. Dietert stressed the need of good housekeeping in the handling and preparing of molding sand. Points emphasized in the talk were moisture, permeability, clay content, and resistance to high temperatures. It was stated that when sand is worked with insufficient or excessive moisture, the casting surface is inferior in finish to that obtained when the sand is properly tempered and worked. The speaker illustrated with slides and castings many of the defects which result from improperly prepared sand. In closing Mr. Dietert emphasized the point that sand control is advantageous to all types of foundries, whether large or small.

**Defects in Nonferrous Castings**

The afternoon session was devoted to a study of practical metal problems and their remedies. In the nonferrous section, with H. E. Alex, Rock Island Arsenal, Rock Island, Ill., as chairman, C. V. Nass, Fairbanks Morse Co., Beloit, Wis., presented a paper "Defects in Nonferrous Castings". Mr. Nass discussed the various defects as listed in the A.F.A. report of the committee on analysis of casting defects. In addition to the causes which are presented in the report, the speaker added other factors which could result in the defects under discussion. The classifications discussed included shift, misrun, cold shut, crush, swell, variation in wall thickness, sand wash, sand blow, core blow, burning into sand, burning into cores, sand sticking in core cavities, and surface imperfections. Mr. Nass pointed out that in many cases the causes of defects are the same in both nonferrous and ferrous foundries. It was also apparent that in many cases the particular cause may result in several different types of defects.

In the gray iron section, with A. E. Hageboeck, Frank Foundries Corp., Moline, Ill. as chairman, M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., presented an interesting paper on "Producing Good Gray Iron". Mr. Gregory described the method used at the Caterpillar Tractor Co., illustrating his discussion with a number of slides. He presented calculations which showed that the melting loss of the plant over a period of 26 days was 4.66 per cent. The cupolas are tapped into receiving ladles at a temperature of from 2830 to 2840 degrees. Alloy and carbon additions are made through funnels at the spout. While various types of cast irons are produced, the same base mixture is used and the changes are made through ladle additions after the metal is tapped from the receiving ladle.

The annual conference dinner was held in the Iowa Union building Friday evening with H. O. Croft, head of the department of mechanical engineering, presiding. Eugene A. Gilmore, president, University of Iowa, spoke briefly of the work of the university and mentioned that approximately 15,000 people visit the campus each year for conferences ranging from one to six days. It is his opinion that the university must supply scientific, technical and cultural leadership as well as instruction for the students attending the university. President Gilmore expressed appreciation that the foundry group had held three conferences on the campus.

Hyman Bornstein, Deere & Co., Moline, Ill., and past president of the A.F.A. discussed "Research and the Consumer". Mr. Bornstein pointed to the contributions which have been made to research by the larger corporations. Research programs not only permit the organization to produce a better product for less money, but often develop new products. Much of the benefit is passed on to the consumer through a better product at a lower cost. The speaker also mentioned the work that has been done by his organization in the development of a short annealing cycle.

**Discuss Equipment Problems**

L. P. Robinson, Werner G. Smith Co., expressed appreciation of conference visitors for the splendid hospitality extended by the University of Iowa.

The Saturday morning session was devoted to "Equipment Problems and Methods". Harry F. Henninger, International Harvester Co. presided at the pattern section which featured a paper by J. E. Colb, Caterpillar Tractor Co., Peoria, Ill. Mr. Colb described in some detail the facilities and methods of procedure for the manufacture of patterns at the Caterpillar Co. He emphasized the co-operation which exists between the engineering department and the pattern shop in changing designs of castings to provide the simplest equipment for use in the foundry. Not only does this co-operation make possible the production of good castings, but when properly developed, reduces production costs.

Mr. Colb illustrated his talk on pattern problems with an exceptionally fine display of wood pattern making tools, metal pattern making tools, patterns, castings, etc. During his talk, a graduate apprentice of the Caterpillar company made a core and rammed up a mold to illustrate the particular points being brought out in the discussion. Mr. Colb pointed out that the more simple and practical a pattern, the more it will satisfy demands of the foundry.

John Diedrich, Blackhawk Foundry & Machine Co., Davenport, Iowa, presided at the refractory session which featured a talk on "Monolithic Linings" by R. E. Wilke, John Deere Tractor Co., Waterloo, Iowa. Mr. Wilke used slides to illustrate the method employed by his company to cover the brick lining of the cupola to a point approximately 5 feet above the upper tuyeres. A stiff mud, composed of 60 parts of sand and 40 parts of fire clay, is used on the new brick to a thickness of about 2 inches. The stiff mud lining is hard to hold on the first heat, but the cupola is patched each time after use and the lining is built back to the original diameter of the cupola with only the stiff mud. This method of cupola lining and repair has been found very satisfactory, according to Mr. Wilke. The cupolas are tapped at about 2850 degrees Fahr.

The final section, devoted to molding, was under the chairmanship of Fred W. Kirby, John Deere Spreader Works, East Moline, Ill. W. R. Jennings, John Deere Tractor Co., Waterloo, Iowa, presented an interesting paper in which he discussed the study which has been made by his organization in determining the proper type of equipment to be used for individual jobs. Mr. Jennings also presented what he called a foot-pound study, in which he determined the amount of work required by the molder in performing each movement. Through this means it should be possible to determine if a particular job requires an excessive amount of energy from the molder. Analyzing the information obtained on an individual case may show the cause of scrap castings due to fatigue of the molder. Further consideration of the subject introduced by Mr. Jennings should prove of considerable interest.

## Purchases Plant

Certified Core Oil & Mfg. Co., Chicago, has purchased the ground and plant previously occupied by Baumgardner Corp. at 5526 West Sixty-sixth street, Clearing district, Chicago. The Certified company does not plan to move into the new property before the first of next April.

American Refractories institute, Pittsburgh, has published technical bulletin No. 71 which relates to "Lining for Reservoirs and Ladles Suitable for Soda Ash Treatment," by J. J. Offutt.

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# System Reduces Time

(*Continued from page* 24)

grinding wheels is mounted on a steel platform about 2 feet above the floor, immediately below the belt and catwalk and between the parallel rows of hoppers containing the castings. With a constant supply within easy reach, the grinding wheel operators can work with maximum speed and efficiency. The ground castings are tossed into steel containers mounted on skids. Lift trucks remove the loaded containers and spot empty ones in their places as required. From the foregoing description it will be noted that gravity —one of the few remaining items on which, at least up to the present, a paternal government has not levied a tax of some kind—gravity plays an important part in the movement of the castings from the sorting belt to the steel containers on the floor.

At the far end of the line and therefore not visible in the illustration Fig. 3 several bins differ to some extent from those used as magazines in connection with the grinding wheels. The lower end of each bin is constricted to a chute which directs the castings into one of the usual containers. These bins receive the odds and ends, castings to be sheared and not ground, short orders, replacements, and other castings which for any one of a number of reasons are not to be further processed immediately. They are allowed to accumulate and then are put through the cleaning department as opportunity offers.

Castings which survive the journey on the first long belt are transferred to a comparatively short transverse belt and discharged on a second long belt running in the opposite direction to the first. This unit is similar to the other with bins on either side and with double wheel grinder stands betwen the bins. Approaching the end of the line the large bins are displaced by a number of smaller bins for the reception of a large variety of the smaller castings. These bins are not attached permanently to the frame work but are suspended from trolley wheels. In the usual day's operation these bins are filled slowly. The grinder moves one close to his wheel, removes the castings one by one, grinds them and throws them in the container. He then shoves the empty magazine out of the way and pulls one of the other bins into place. In this manner he is kept working at full efficiency irrespective of the large or small volume of castings flowing along the belt overhead.

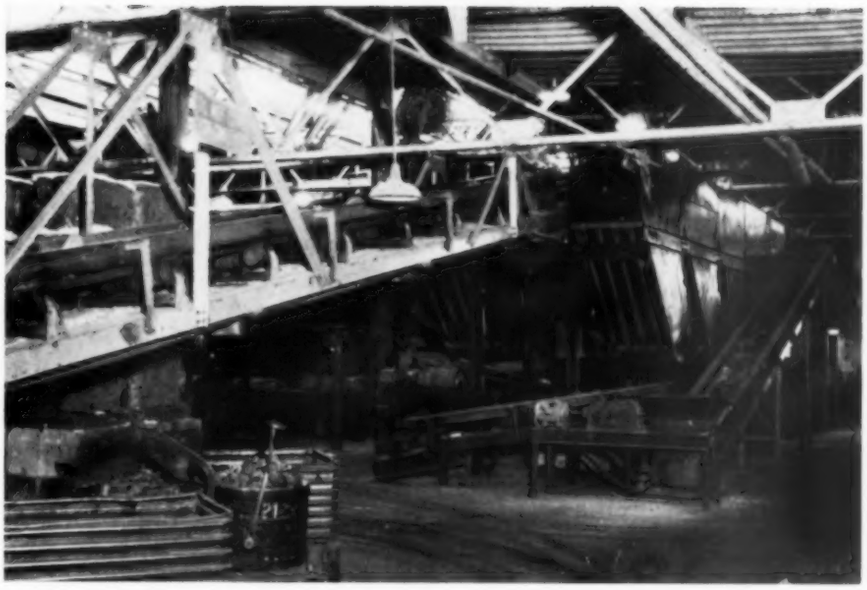


**Fig. 4—Soft iron castings dumped on an inclined belt are discharged on to a long rubber conveyor belt**

Containers loaded with castings are removed by lift truck and deposited in the vicinity of either a battery of 26 tumbling barrels, or a battery of six wheelabrators as shown in Fig. 2. Method of operating the tumbling barrels conforms to ordinary routine practice and presents no particular feature of interest with the possible exception of the neatness and order which prevail and which are in keping with the general program of good housekeeping manifest throughout the plant. Each tumbling barrel is connected to a central exhaust system and as a result, the atmosphere is singularly free from dust. This feature later will be touched upon a little more in detail.

The whellabrator installation, product of the American Foundry Equipment Co., Mishawaka, Ind., contains six units arranged in pairs, with space at one end reserved for a fourth pair when and if conditions warrant. A hoist suspended from a monorail picks up the loaded containers and dumps the castings into a hopper above each pair. The hopper is provided with two chutes at the bottom through which the cast-

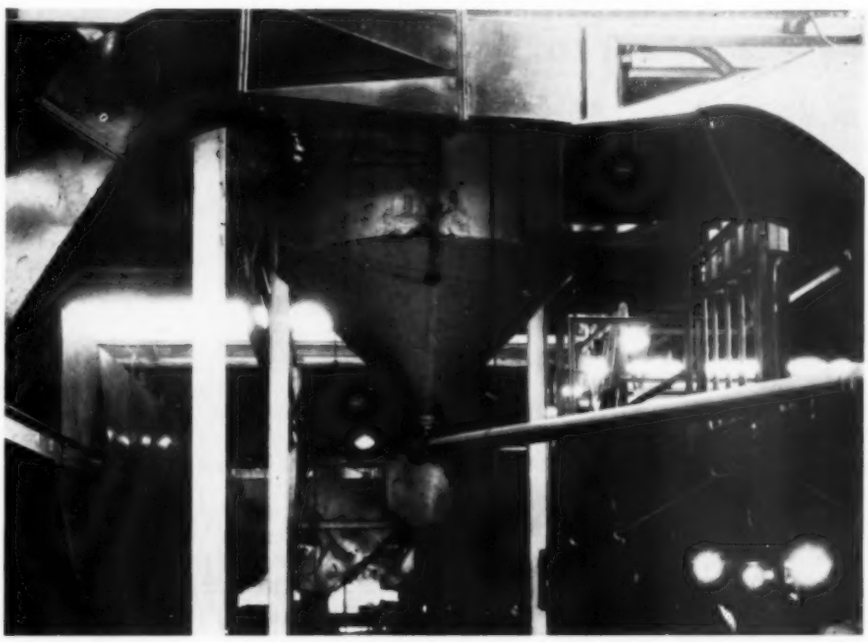


**Fig. 5—Lower part of one of the towers, ducts for incoming material, and pipe connections for removal of sludge are shown**

ings may be delivered either to the right or left unit by gravity. Push button control locks the door and sets the device in motion. After a predetermined time interval the device stops automatically and a horn is blown to notify the operator who attends the entire battery. The door is opened by a small pneumatic attachment and the castings pour out and into a waiting container on the floor. The door then is closed on another batch.

Modern cleaning room progress is further accentuated by practically complete elimination of dust from the atmosphere. An extensive system of piping carries the dust from the various operating units to two central towers supplied by the Claude B. Schneible Co., Chicago. One of the dust collection towers serves the tumbling barerls and wheelabrators. The other removes the dust from the grinding wheels under the rectangular sorting and distributing belts referred to previously. Space under the grinding wheel stands serves as a tunnel through which the air is drawn by a powerful suction fan. Under the second belt and set of grinding wheels, the tunnel is extended into a V-shaped trough in the floor. Discharge water from both towers flows through this trough and carries the sludge to a tank. Later, this material is pumped through a long pipe line and deposited over a low lying section of the company's property.

The cylindrical tower contains a number of horizontal disks from which curved vanes are suspended. Dust laden air enters the tower through a duct just above the bottom cone and tangentially below the lowest or vaneless impingement plate. The air is given an initial rotary motion further induced by the curved vanes on the other impingement plates as it travels upward. The cone shaped bottom serves as a wet cyclone collecting the heavier particles as they enter and forming a vortex into which the fine particles are precipitated.

A small stream of water is introduced above the center of the top impingement plate and flows downward by gravity against the upward flow of the rapidly rotating dust laden air current. The rotary motion of the ascending air sets up a similar motion in the descending water spray and distributes it evenly over the disks, vanes, shelves and side walls of the tower. Violent whirling action forces the liquid off the edges of the disks and shelves in a finely divided spray. The atomized liquid envelopes the dust particles rising with the air and carries them down into the cone. The washed air passes through an entrainment separator at the top of the tower where it is freed of any excess moisture.

# Patterns Must Be Good

(*Concluded from page* 28)

go that is not perfect. This inspection card is then gone over by the pattern foreman who sees that any necessary corrections are made.

Proper procedure when inspecting a finished pattern is first to note whether all bosses and projections are on the pattern and on the correct side. The core boxes should be examined to make sure they are all there and to see that each has been made to the right or left as the case may be. Check any loose pieces. Make sure they are all present and fastened in the proper location, then proceed to set up the pattern.

First of all, determine if the center lines on both sides of the pattern match and then proceed to check all dimensions taking the horizontal first and then the perpendicular. With this procedure you are less liable to overlook any part of the work. It is often a profitable and practical course to pursue when possible to have your foundry put up a mold and try each core to make sure that each one fits correctly so that the molder will have no trouble in production.

Frequently I have been asked what shrinkage we use on the various automotive castings. That is a real hard question to answer. The only way that it can be answered correctly is by thorough study of the pattern job in question. On most cylinder blocks, there are two shrinkages used—⅛ and 1/10-inch and sometimes 9/64-inch per foot. The pattern is laid out to 1/10-inch. The barrel prints are spaced to ⅛-inch shrinkage. The large end of the core is laid out to 1/10-inch shrinkage starting from the center of the crank case.

You have had experience with some particular casting warping and you just warp the pattern the opposite way to get the casting to come straight. This method has been used on automobile cylinder blocks but there is such a variation in the shrinkage of different type cylinder blocks, the only real method of getting the shrink correctly before proceeding to lay out or make a production pattern is to take a few castings made from the experimental pattern and cut them through the water jackets and the cylinder bore and make a thorough study of the shrink that has developed in these castings.

The metal pattern equipment should then be built according to the results of that study. A short time ago, we completed a large diesel block 72 inches long and we used 1/10-inch shrink in the length and height and standard rule on the width. On the diesel head all made in dry sand, the shrink used was 1/10-inch in all directions. The sample castings made from these two equipments checked perfectly.

No one realizes quite as well as the foundrymen the importance of well designed and well built pattern equipment and the ability of the patternmaker to make patterns which facilitate rapid and economical production of castings or which hamper production when not properly designed and made. The urge to improve one's position in life is common to all. It is a natural law which must be served. The pattern making industry can benefit itself by taking advantage of every possible opportunity for the improvement and advancement of the foundry industry.

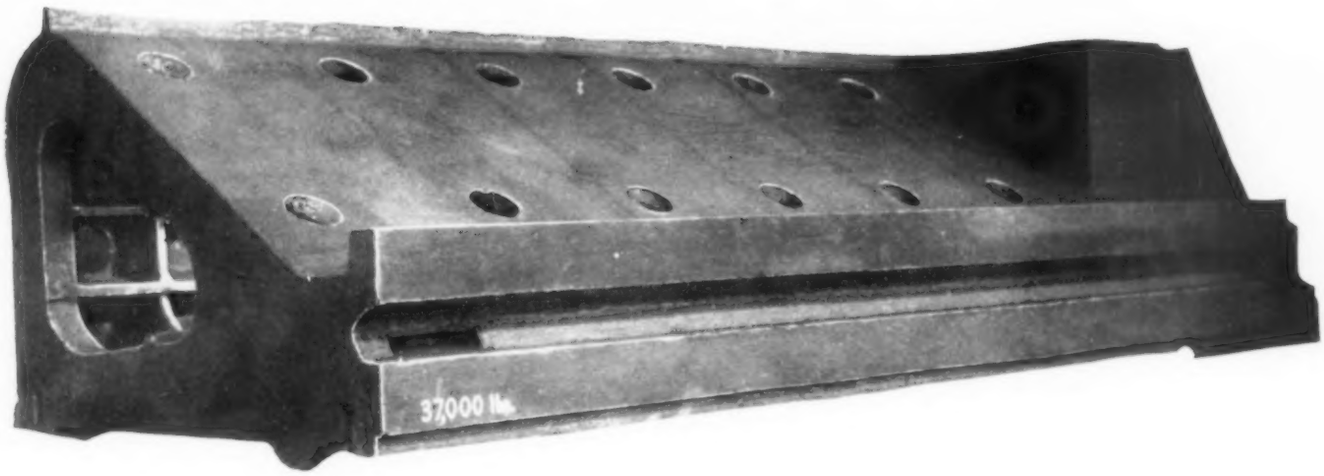
## Present Report on Steel Castings

Following cancellation of the joint autumn meeting of the Iron and Steel Institute and the Institute of Metals (Great Britain) that was to have been held in New York on Oct. 3 and 4, the autumn meeting of the Iron and Steel Institute took place in London on Wednesday, Oct. 26, at the Institution of Civil Engineers. Papers presented for discussion included:

"American Electric-Furnace Practice," by W. M. Farnsworth and E. R. Johnson and "Electric Furnaces in European Steelworks," by D. F. Campbell. Special Report No. 23 was also presented for discussion, this being: "Third Report of the Steel Castings Research Committee," by a joint committee of the Iron and Steel Institute and the British Iron and Steel Federation, reporting to the Iron and Steel Industrial Research Council, and the Institute of British Foundrymen accepted an invitation to take part in the discussion. This report includes: "First Report of the Molding Materials Sub-Committee"; "The Strength and Ductility of Cast Steel During Cooling from the Liquid State in Sand Molds—Part II," by H. F. Hall; "Copper-Steel Castings," by Martin Alexander; "The Fluidity of Alloy Steels," by Prof. J. H. Andrew, G. T. C. Bottomley, Dr. W. R. Maddocks and R. T. Percival; "Works Results Using the Ruff Fluidity Test," by T. R. Walker; "Fluidity-Temperature Relations of Cast Steels of Various Compositions," by Dr. R. J. Sarjant and T. H. Middleham.

# Easy Cleaner Core Compound

## *will work just as efficiently for you*




Column casting 15 ft. long, 7 ft. wide, 5 ft. high, weight 37,000 lbs. tensile 43,000 lbs. per sq. in., metal sections from 1 in. to 4 in. mix 35% steel plus alloys.

*Made by*

**Marion Machine Foundry & Supply Co.**
**Scottdale, Pa.**

Mr. Sam Shupe, in charge of the foundry, says this machine tool casting was made entirely in dry sand cores, using Easy Cleaner Core Compound exclusively, and the cores cleaned out so easily that cleaning time was practically nothing.

Easy Cleaner Core Compound mixes easily with the sand, is used sparingly, the cores hold up beautifully, they clean out very easily and the cost of Easy Cleaner is surprisingly low.

EASY CLEANER CORE COMPOUND IS MADE ONLY BY

# J. S. McCormick Co.

**Pittsburgh, Pa.**

# Install Equipment Now

(*Concluded from page* 25)

neering and construction firms has the following to say in a recent published article:

* * * * there are savings in labor cost to attract the firm which is considering further growth. Although there has been little or no reduction in wage scales, labor costs during 1938 are running about 5 per cent lower than last year. Although wages have not been reduced, it must be borne in mind that labor costs are directly affected by the hourly output of the individual mechanic on any construction project.

Today many of the most skilful men in all trades are available for employment. Their daily output of work appears to be substantially greater than last year. These conditions result in lower unit costs throughout and better workmanship.

Summarizing this comparison of cost of factory building today with a year ago, the total of 12½ per cent savings in tax money, plus 8 per cent to 10 per cent on materials and machinery, plus 5 per cent on labor (which amounts to about 2½ per cent on total building cost), results in an impressive over-all saving of about 23 per cent to 25 per cent.

### Investment Is Less Today

If a plant were to earn a sum equivalent to the aggregate savings outlined above in a period of 2 years, it would be performing a creditable job. The company which builds today, compared with a year ago is, in effect, beginning operations with two years of profitable production at the start. In any event, it is no doubt true that a substantially smaller investment is required today than in the immediate past and, more than likely, less than in the near future.

Installation of any piece of equipment usually requires a period of transition from old to new during which shop crews familiarize themselves with the new order. It is much more desirable to make this change-over when the foundry is not so busy, working out any of the kinks and being ready for the big push later.

Certain equipment, particularly custom-built installations, can produce a great deal more in the end result if sufficient time is taken to study the peculiar conditions in an individual plant. Various combinations of equipment are possible; to work out the one best suited for a particular requirement can be done much more satisfactorily when there is not the urge and pressure to meet the demands of, say, the company's three best customers. In other words, when a foundry is operating at a lower than capacity rate the founlry staff as well as the equipment builder's engineers can take more time for the desired studying, checking and considering.

From the standpoint of the amount of money expended for equipment there seem many reasons why costs and therefore sales prices should increase. The various forms of social taxes, such as Unemployment and Old-Age Benefit, will increase rather sharply in the future. Then the provisions of the recently enacted Fair Labor Standards act do not give promise of lower costs. These conditions, together with the trend toward continually higher wages encouraged by the present federal administration, indicate higher prices. A statement common among equipment builders today is that they have reached rock bottom prices and any change must be upward; in fact, some have even pointed out that if they are to continue in business they must raise their prices, and most builders of all types of equipment do plan to continue to operate their establishments.

### Careful Study Takes Time

It should be borne in mind that an intelligent expansion program and one from which best results can be secured does not evolve over night. Careful study of possible improvements with the thought constantly in mind of best results procurable, requires time. How many times have we seen improvements made to a foundry in the hurry and pressure of increased production schedules, to find later that a little more thought, a little more careful planning, would have improved immeasurably the results and probably even reduced the cost.

Foundry history shows that with each return period of better business there is demand for improved casting quality without a corresponding willingness to pay an increased price for the improved product. Leaving aside for the moment discussion of the many reasons which might be set out to meet that kind of situation, it must be recognized that modern equipment can help the foundryman hold his gains and improve his company prestige.

There is much comment in conversation and discussion in the newspapers of the work relief program of the government. Various alphabetical agencies unquestionably have been spending huge sums of tax money, and the thoughtful, practical business man has a right to be concerned with how the bill is going to be paid, especially when our past experience shows that the aforesaid business men, principally manufacturers, have been asked to pay the largest portion of taxes in the past.

The further fact that government subsidy of various forms of work to stimulate employment is not new, the device having been employed by governments generations ago, even as far back as the ancient Greeks, does not help in the present situation.

Stripped of all verbiage, the facts are that people could not be permitted to starve during the lengthy period of unemployment, and the government's gesture has been regarded by many whose votes count just as much as yours and mine, as a sympathetic, understanding move. The big point is, what are we going to do about it now?

Industry can initiate its own make-work program. There is no doubt that there is enough potential equipment required by the foundries of this country to provide a marked stimulus to the present business picture. Purchase of new equipment means increased calls for castings. If the foundries of this country were to start out with a well thought out program to improve their physical set-up, and *Do Now* the things the majority surely will do later, everybody along the line would benefit, and the foundry operator would receive the greatest returns. It is just wise procedure and good business to purchase equipment at this time.

## Book Review

*Technical Analysis of Ores and Metallurgical Products*, by Franklin G. Hills, cloth, 198 pages, published by the Chemical Publishing Co., New York, and supplied by THE FOUNDRY, Cleveland, for $3, and in Europe by the Penton Publishing Co. Ltd., London.

This book covers analysis of usual ores and metallurgical products, as well as those of rarer occurrence. It reports important chemical reactions, although it assumes that the reader is familiar with elementary chemistry. References are given at the close of various chapters. The book offers to the chemist, student and engineer information on numerous methods of metallurgical analysis.

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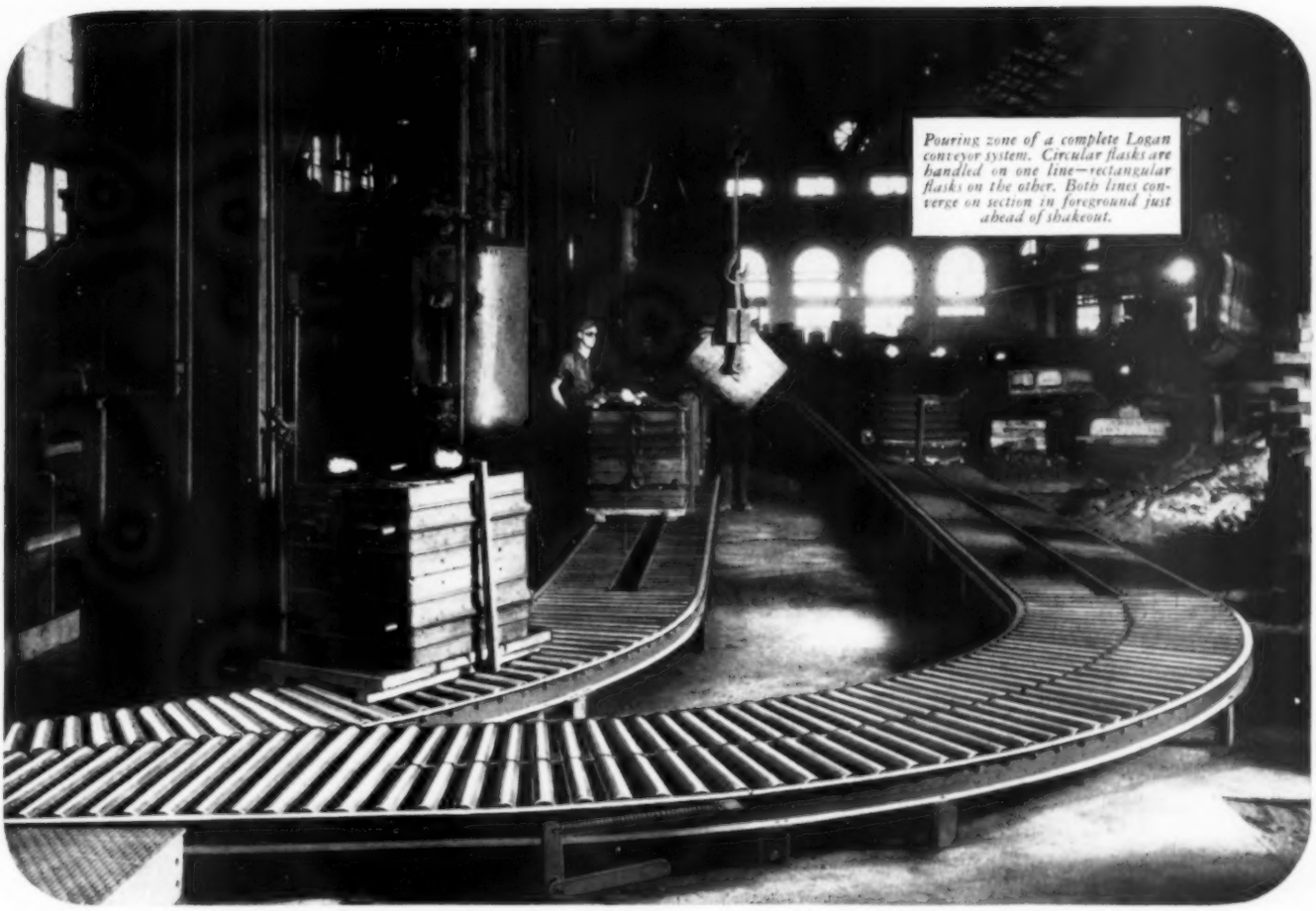
National Bureau of Standards, Washington, has published Research Paper RP1120 entitled "Determination of Boron in Steel and Cast Iron," by John L. Hague and Harry A. Bright. The paper describes in detail the distillation process for the determination of small amounts, 0.005 to 0.1 per cent, of boron in steel and cast iron. Copies of the paper may be obtained from the superintendent of documents, Washington, for 5 cents each.

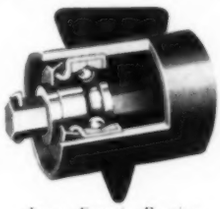


*Pouring zone of a complete Logan conveyor system. Circular flasks are handled on one line—rectangular flasks on the other. Both lines converge on section in foreground just ahead of shakeout.*

# *A Cast Iron Rule*
# FOR FOUNDRY ECONOMY

A RULE expressed in one word—*Conveyors.* Effecting economies through savings in time, effort, floor space, and accurate scheduling. Modernizing the foundry for continuous-flow production.

Logan Conveyors are designed to meet the severe requirements of foundry service. Rolls may have pressure lubricated or grease-packed bearings, or dust-protected bearings running dry. All-steel seals have indefinite life and give maximum protection with a minimum of friction loss.



*Logan Foundry Bearing is in protected position—set back from end of roll. All-steel seals.*

If frequent regreasing might be neglected or is impractical the dust-protected construction with *lubrication omitted entirely* is recommended. This eliminates the sluggish effect of grease and the Logan design tends to self cleaning as roll revolves. . . . ★One foundry writes, "We hesitate to judge the life of the bearings because they have operated over ten years and are in good condition today", another writes, "In constant use on three 8-hour shifts per day since 1927—no expense for repairs during this time—bearings were not lubricated".

For further information write on your letterhead for Bulletin 15 or ask for the nearest Logan engineer to call. No obligation. Logan Co., Inc., 580 Buchanan St., Louisville, Ky.

★Names furnished on request.

MOVING IS 90% OF MAKING

# Logan Conveyors
LOUISVILLE

# Brass Foundry Cores

(*Concluded from page* 31)

binders do not give way sufficiently to protect the castings from cracking during solidification of the metal. A core made of pure sharp or silica sand absolutely free from clay or any gas producing material, mixed with a small amount of glue dissolved in water will stand these excessively delicate conditions.

Glue bonded cores are used only under the most extreme conditions. The bond when burned by the hot metal in the molds generates a gas with a very unpleasant odor and leaves the sand pile loaded with this unpleasant smell. The core sand becomes mixed with molding sand during the shake out process with the resultant presence of some unburned glue in the sand pile. Molds made from this molding sand produce a very unpleasant condition in the foundry. Glue bonded cores do not permit of storage and if placed in a green sand mold for any length of time will be softened by the moisture from the green sand. Trouble is very likely to result in the form of blow holes. Lack of stiffness may result in irregularity of shape or position of the core during casting.

**Permeability Hinges on Grain Size**

Resin or pitch binders are mixed with core sand of the usual type, silica or washed beach sand in the proportions best suited to existing conditions. Vendors of these binders are prepared to recommend a range of sand to binder ratios within which the different hardness of cores may be obtained. After they are baked the cores present very good surface. If properly baked they show a reasonable permeability, depending upon the coarseness of the sand from which the cores were made.

If baked too rapidly the outside of the core may be overbaked while the inside may still be moist. Cracks may result from too rapid baking. The cores may swell if the baking speed is too rapid. Proper baking speed for the specific mixture should be determined carefully and every precaution should be observed to insure uniformity of baking speed for each ratio of sand to binder.

With large cores it is advisable to provide free venting from the center. Even in small cores vent passages should be provided to insure free escape of gas evolved from combustion of the binder by the hot metal in the mold. Pitch binders develop a considerable amount of gas. In washing pitch or resin bonded cores with a core wash, care should be taken that the wash is applied uniformly. If the cores are dipped in the core wash, they should be dipped in and out of the wash very quickly and dried immediately.

There are occasional demands for loam cores in the brass foundry. They are required only where very large castings are to be made and even then cores made from some of the previously described mixtures rammed in core boxes or swept up on core forms have proved satisfactory. In the production of loam cores the process varies in different foundries. Usually they are swept on a mandrel or core barrel properly designed to provide free venting. The mandrel is a wrought or cast pipe or some other hollow form with amply perforated to permit the gases to pass into the center.

**Barrel Covered with Rope**

The mandrel is wound with a hemp or straw rope which provides flexibility or elasticity in the core when stress is applied by the shrinking metal. This hemp or straw forms the base for the mixture of loam made up of molding sand and sharp sand carefully mixed with the necessary amount of bond, usually fire clay bond. Proportion of this bond to sand varies with different foundries and should be varied for different conditions, mass of metal to surrounding core, pouring temperature, pressure exerted on core by height of riser and other factors, all of which combined do not permit of arbitrarily laying down the proper ratio here.

After the finishing coat of thin loam has been applied, the core should be dried carefully. The drying temperature should be low at first, about 300 degrees Fahr. After about 2 or 3 hours, the temperature may be increased up to about 400 degrees Fahr., and the drying should be completed at this temperature. Loam cores should be painted with a high grade graphite or plumbago core wash and carefully dried thereafter. Then they are set into the molds while still warm to prevent absorption of moisture from the green sand mold. In fact, best practice dictates that they should be used only in dry sand or loam molds.

Care should be taken to provide adequate vent through the mold connecting with the vent or vents in the core so that no back pressure can result from the development of gases by the presence of the hot metal. The loam surface on the core is low in permeability or venting power. As it becomes heated in the presence of the hot metal, a relatively large volume of gas is generated by combustion of the bonding and other materials in the loam mixture.

A number of general rules are well to observe in core making practice:

The first is to mix the binder thoroughly with the core sand and be sure that the binder is distributed uniformly throughout the entire mass of sand. This is a very important item in the production of good cores.

Always provide adequate venting so that gas will escape through proper channels instead of passing into the mold cavity to enter the metal and produce blow holes in the casting.

Where cores are rammed by hand in a corebox, the sand must be rammed as uniformly as possible to prevent the formation of hard spots in the cores.

Never apply core wash to the core prints. Core prints properly designed are exactly the right size. If a thickness of core wash is added, the size of the print will be increased and may cause a crush when the mold is closed on an excessively large core print. Vent from the core is carried through the print and may be stopped if the core wash is allowed to cover the print.

Where the core wash accidentally enters the core vent it is better to discard the core as useless rather than attempt to use it in the hope of producing a good casting. The chances are that the casting will be spoiled.

**Dryers May Be Necessary**

Every precaution should be taken to avoid anything that will vary the size of any part of the core in the green state. Handling may cause swelling or distortion. In many instances dryers must be provided to facilitate handling the core without affecting its true shape and size. Baking at too high a temperature may cause the steam and gas to evaporate too rapidly from the core and result in distortion or swelling. Avoid this distortion by the standardization of baking practice for the size of core, the kind of binder and other factors affecting this condition.

Cores in the baked state should be used as promptly as possible. In storage they are subject to damage either by absorption of moisture or by accident. Parts are broken off. Absence of these parts is not noted until a defective casting is produced.

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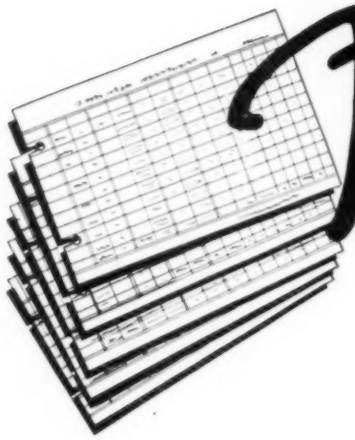
National bureau of standards, Washington, has issued circular C417, entitled "Gas Calorimeter Tables" which contains condensed directions for operating a flow calorimeter for gases with forms and directions for recording and computing results, etc. Copies of the circular may be obtained from the superintendent of documents, Washington, for 10 cents each.



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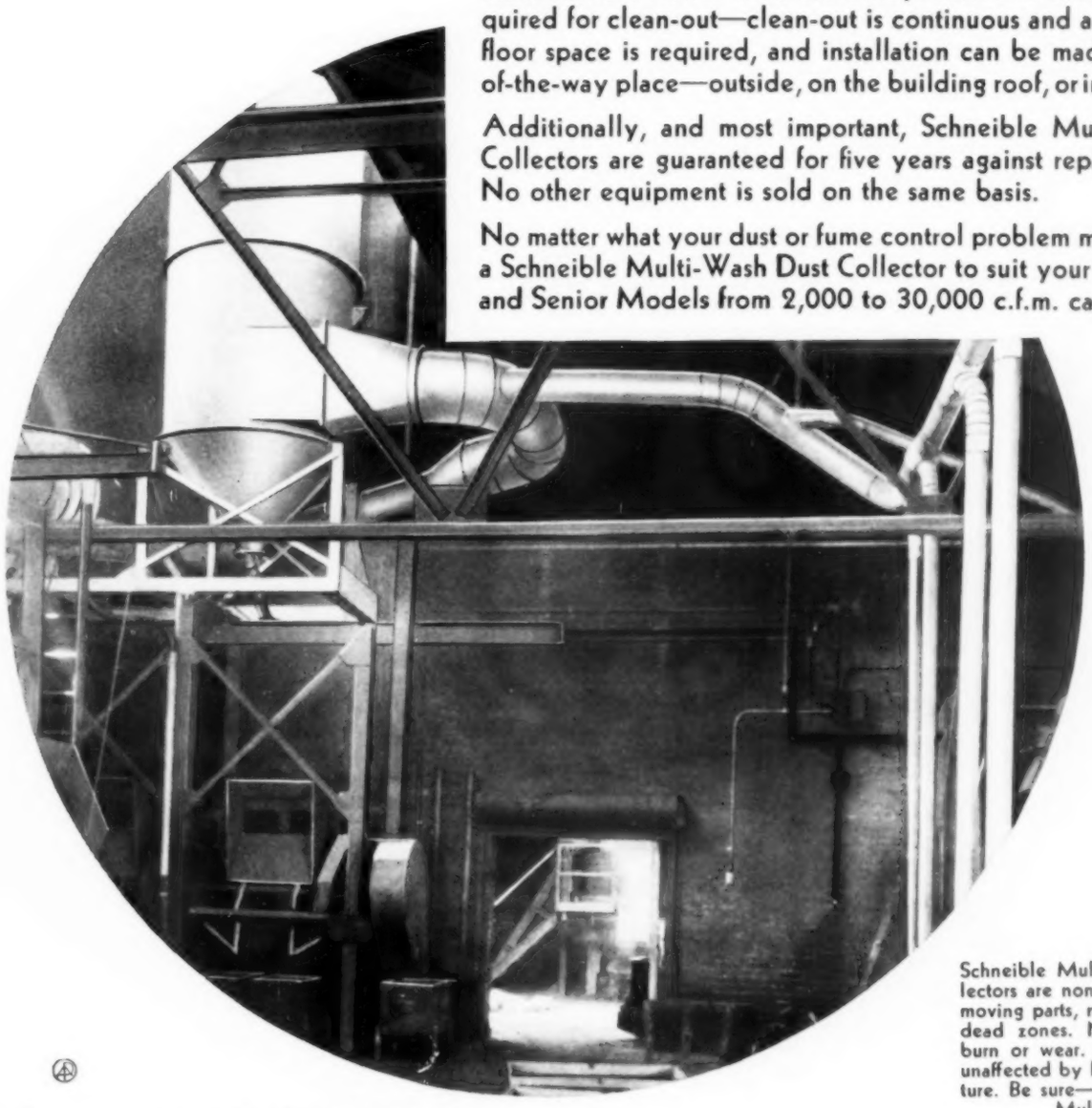

Schneible Multi-Wash Dust Collectors are non-freezing; have no moving parts, nozzles, pockets or dead zones. Nothing to break, burn or wear. Their operation is unaffected by heat, cold or moisture. Be sure—get the best—buy Multi-Wash.

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## CLAUDE B. SCHNEIBLE CO.

**DUST SUPPRESSION ENGINEERS**

**3951 LAWRENCE AVENUE, CHICAGO  OFFICES IN PRINCIPAL CITIES**

# Preventing Blow Holes

(*Continued from page* 32)

heat gradient. Pouring temperature and pouring rate also are a function of the position and number of gates and is completely tied in with the method of obtaining the proper heat gradient.

Pressure exerted on a casting by the cores and mold itself have a powerful influence toward preventing shrinks on castings of the proper sections and contours. Some castings with a large volume of internal cores are provided with risers when a riser is not necessary. Heat of the metal on cores and mold causes them to expand, which creates a pressure on the casting and eliminates shrinks.

Perhaps the one thing that causes the most shrinks and frequently is the most difficult to correct is faulty design. A blue print or pattern is received in the foundry with instructions to go ahead and make a casting. The drawing or pattern may have unequal sections, sharp corners, or long thin, narrow sections. If the foundryman suggests any changes before putting it in the sand, almost invariably any suggestions he has to make are ruthlessly over-ridden or silenced. He is told the blue print shows the shape and design required and no changes will be permitted. When the casting is poured and is found to be defective because of shrinkage, either as cracks or internal voids, almost invariably it goes down as foundry scrap. Sometimes several pieces are cast and scrapped before a change will be permitted. Frequently no changes will be permitted and the foundryman struggles along taking a large scrap loss on this particular job. The foundryman working with the engineering or design department that is aware of some of the casting difficulties encountered in the foundry and designs machine parts with an intent to favor easy castability is indeed fortunate.

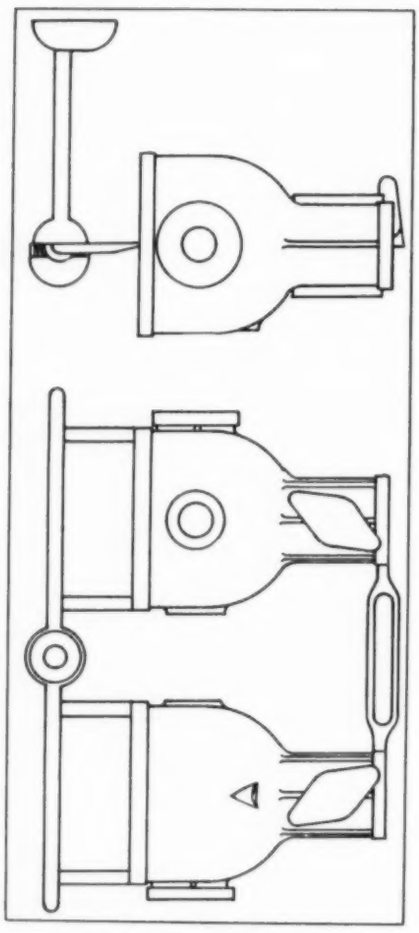

Fig. 11—Gating and shrink bob

**Preventing Shrinks and Blowholes**

From a paper presented before a regional meeting sponsored jointly by the Detroit Chapter American Foundrymen's association and Michigan State College, April 15 and 16, at Michigan State College, East Lansing, Mich.

Usually a shrink is the result of only one of the foregoing causes, but occasionally one finds a shrink condition due to several contributory poor practices. When due to only one cause a shrink is relatively easy to correct, but when it results from a series of contributory causes, then the entire operation needs correcting. Correction of one cause lessens only the extent or perhaps just the frequency of the occurrence.

Blowholes are fully as aggravating as shrinks, but generally easier to correct. This is due to the fact that a blow generally can be traced to a mechanical cause as the result of carelessness in some operation. Blowholes appear under several classifications: External which easily can be distinguished; internal which are sometimes called gas holes and are caused by gas being trapped in the metal; and those that reflect on the iron by having the appearance of cold shuts.

Blows are caused by the accumulation or generation of gas. Gas always is evolved when a casting is poured in sand. Scrap due to blows is caused when this evolution of gas is too violent or too copious. Scrap also can be caused by a moderate amount of gas that has no way of escaping. Scrap can be avoided even where the gas must escape through the metal, providing the metal is fluid enough and will settle back after the gas disappears. To prevent blows one must avoid a too rapid evolution of gas and permit what gas is formed to escape by proper venting and ample sand permeability.

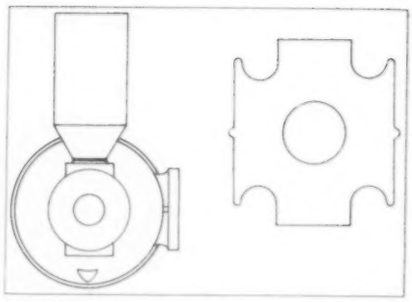

Fig. 12—Typical riser and cross section

Rapid evolution of gas can be expected in a wet mold. This moisture may come from wet cores, wet sand, wet facing, wet blacking, wet paste. A gassy mold may result from too much sea coal in the sand. Gas may be prevented from escaping by improper venting, iron getting in the vents, poor permeability, or sand that is rammed too hard.

Sometimes blows result from too much gas in the iron. An iron that bubbles or boils in the ladle frequently leads to scrap. An iron that has been remelted continuously under poor melting conditions may be the cause of blowholes. A good check on iron and how it lies in the mold is to look down a riser during the pouring operation. An iron that lies quietly in the mold will not show a blow. If it is impossible to observe the iron action through a riser, sometimes it is good policy to pour an open mold to check on the source of blows.

The accompanying illustrations show some of the defects mentioned and the steps taken to correct them.

Fig. 1—Sheave wheel or pulley, from 20 inches up to 4 feet in diameter. Grooves on face from 1½ to 2 inches deep. Shrink appeared at junction of spoke and rim. No harm, but customer objected it did not look good. Chills not successful. Two methods of correction: by adding bead at parting line and by changing metal composition.

Fig. 2—Refrigerator crankcase, 10 inches high, 8 inches across bell, weight 17 pounds. Shrink in heavy section boss. More trouble to correct than many larger castings. Cost prohibited use of alloys. Lowered carbon and silicon, raised manganese and incorporated shot in barrel core. Poured castings from brake drum iron.

Fig. 3—Fly wheel up to 3800 pounds. Rim and hub enlarged without changing spokes. Castings

(*Concluded on page* 87)

(*Concluded from page* 84)

left in sand from 24 to 36 hours. Spokes cracked in sand or in cleaning room. Increased size of spokes and placed three risers as shown. No further cracked spokes.

Fig. 4—Large pistons from 4 to 18-inches diameter. Two types shown. Heavy head on one. Molded horizontally two or four in a mold. Skirt holds core and creates pressure on heavy end. All scrap where sand is wet. Formerly molded on end with average of four good castings out of 100.

Fig. 5. — Diesel head, pouring weight approximately 300 pounds. Shrink appeared in heavy section which must be sound and pressure tight, and machined later on dotted lines. Formerly churned, later cored large head. Use of internal chill prevented drilling of straight hole. Smaller heads, diamond shaped section not satisfactory. Corrected with high steel mixture fluid and full of life. Used insulating powder on riser. Core pressure caused metal to back up in riser. Chilled with water.

**Cool Hub Rapidly**

Fig. 6—Pulley 5 feet diameter, 2-foot face, thin rim, good machining required for crown. Molded in dry sand with ample amounts of coke to facilitate contraction. Spokes cracked. Molded with more difficulty in green sand. Spokes cracked. Checked with engineering department. Design weight and balance correct. Allow no change although over a period of years the average loss was 50 per cent. Employed old foundry kink. Air siphon used to remove center core and cool hub rapidly.

Fig. 7—Small refrigerator pistons 2 x 2½-inch made with ram-up cores. Thin side walls and skirt. Traced blowholes to wet cores, gassy cores, wet sand and too much sea coal.

Fig. 8—Solid fly wheel up to 8000 pounds. One large riser better than two smaller ones. Used insulating powder on riser and churned with rod. Broke one under skull cracker. Grain coarse near center but no segregation. Changed load on one engine and cut wheel down 4 inches diameter and 3 inches on face. Grain still close and dense. Blowholes on face if mold is wet.

Fig. 9 — Cylinder, 1100 pounds poured horizontally with no riser. Poured rapidly. Pressure prevented shrinkage. Over 200 poured without loss. Formerly poured on end. Blowholes on top.

Fig. 10 — Sheave wheel approximately 18 inches diameter with two grooves. Shrink appeared under the riser. Flask was intended for another job. Did not want to take time to build up riser and could not increase diameter. Used insulating powder to keep metal alive in riser.

Fig. 11—Gating and shrink bob. Bob not effective enough, pulled down and broke in. Used original gating and adopted proper heat gradient.

Fig. 12—Typical riser and cross section where riser reduced segregation. Lower pouring temperature, slower pouring time, reduced sprue size. Spread from 20 to 31 seconds. Checked cooling rate, raised steel content 13 per cent. Remainder of charge 30 to 40 per cent pig iron and 30 to 40 per cent scrap. Silicon and carbon kept on low side. Scrap reduced to 1 per cent.

# Operate On Clean Oil

(*Concluded from page* 30)

entrance concentric with the air supply pipe which is slightly restricted at the outlet end to give a static air pressure of about 3 inches of water. All the combustion air passes through the fan which is regulated by a simple gate set in position to maintain the desired fuel to air ratio.

For any desired nozzle capacity, the fan adjustment must be made only once and thereafter the same furnace atmosphere will exist whenever the burner is in operation.

Selection of nozzle size or capacity is based on experience. The most efficient rate is taken as that which gives the highest fuel economy without a material increase in melting time. This rate is nearly the same for all brasses and bronzes when melted in the same size crucible and furnace. Therefore, it is necessary to change nozzles to higher capacities only when iron, nickel or monel metal is being melted.

Full effectiveness of any oil burning system in maintaining steady conditions without attention of the operator can be had only when dirt-free fuel is used. Even very fine dirt particles cause nozzle wear and will cause slight variations in flow which in turn upset the flame adjustment.

To insure only dirt free oil passing to the nozzles, a small Goulds hydroil centrifugal purifier is used in the system. This purifier is placed in a small room with a 200-gallon capacity day tank supplied from a large outside storage tank. Oil is drawn from the bottom of the day tank by the suction pump of the purifier and delivered to the centrifugal bowl where all water and dirt are removed. The clean oil is discharged to the burner supply header. Over-capacity not required by the burners is bypassed back to the day tank.

Centrifugal force is the most positive and rapid means of removing dirt and water from oil. The small unit in use on this system has a capacity of over 50 gallons an hour. Pumps for handling the oil are standard parts of the unit. Water that may be in the oil is discharged continuously as it is separated while sand, scale, and other foreign material are retained in the bowl.

Power required for cleaning the oil is not appreciably more than would be required by pumps alone in handling the oil. It requires about 5 minutes time to remove the dirt accumulation from the small hydroil bowl. This is done once a day or less, depending upon oil condition.

At present a rather light grade of fuel oil is used. This oil normally is quite clean, but it has been found that positive removal of even small amounts of fine scale, sand, and water is worth while in the elimination of upset flame conditions and time in cleaning nozzles. All available accumulations of discarded automobile crankcase oils, etc., are used with good results. These heavier oils usually are mixed with the less viscous fuel oil in proportion that makes preheating unnecessary. Amount of dirt and water of course, is increased with the use of these oils.

**Secures Fuel Economy**

While probably the greatest value of steadily maintained melting speeds and flame conditions is reflected in the quality of the castings, a fuel economy results through use of an efficient flow rate. For melting the general run of bronzes in No. 80 crucible, a nozzle giving a flow rate around 7 gallons an hour has been found economical. When nickel, iron, or monel is melted, a 9 gallon per hour nozzle is used.

Records taken over a period of nearly one year show that melting 85-5-5-5 brass and raising it to a pouring temperature of 2200 degrees Fahr. takes an average time of 50 minutes. This average includes first heats on cold furnaces. The 250 pound charges usually are made up of chips, gates and ingots. Fuel consumption averages 2.4 gallons per 100 pounds.

Phosphor bronze brought up to a temperature of 1900 degrees Fahr. requires an average time of 35 minutes for a 250 pound charge. Starting with a hot crucible and hot furnace, this same charge is melted in 25 minutes. The fuel consumptions are 1.7 and 1.2 gallons per 100 pounds.

Lindberg Engineering Co., Chicago, has opened an office at 220 Delaware avenue, Buffalo, in charge of Harry O. Munn, formerly chief engineer of the company.

# Poland Is Host

(*Continued from page* 35)

president of the committee for the next period of 3 years; Prof. A. Portevin remaining as general president, in charge of the general policy of the committee, also for a period of 3 years.

Dr. Paul Schwietzke presided at the meeting of the International Committee of Foundry Technical associations, at which the foundry associations of 11 out of 12 member-countries were represented. The formal invitation to hold the seventh World Foundry Congress in London, in June, 1939, was given by John Cameron, past-president, Institute of British Foundrymen and head of the British delegation. It was confirmed that an International congress would be held in Italy in 1940, and one in Holland in 1941. On behalf of the American Foundrymen's association, Vincent Delport, European delegate, asked the meeting to give its approval to the holding of a world congress in the United States in 1942, and this proposal was accepted unanimously.

**Elect Technical Committee Officers**

The meeting then proceeded to the election of its officers for the year 1939. Dr. Guido Vanzetti, president, foundry section, Federazione Nazionale Fascista degli Industriali Meccanici e Metallurgici and managing director, Fonderia Milanese di Acciaio Vanzetti, Milano, unanimously was elected president. By a unanimous vote, it then was resolved that the Association Technique de Fonderie of France should designate one of its members as vice president of the International committee. Tom Makemson, secretary, Institute of British Foundrymen, was re-elected honorary secretary of the committee.

After the meeting, the members of the congress proceeded to the tomb of the Unknown Soldier, on which the heads of the foreign delegations, led by Dr. Paul Schwietzke and Prof. Gierdziejewski, laid a wreath. The members of the committee then were entertained to lunch by Dr. Schwietzke.

Early in the morning of Monday, Sept. 12, members of the congress started from Warsaw in motor-coaches for a week's tour consisting of works visits and excursions in the Carpathian mountains. After stopping on the way to inspect work being completed on a large hydro-electric station and barrage on the river Sola, the party stopped at the Starachowice iron and steel works, which obtains its iron ore from local mines.

After lunch, which was offered by the works management, the members went on to Ostrowiec Zaklady and inspected an important pipe foundry where pipes are cast centrifugally by the de Lavaud system. These works also manufacture railroad material, particularly wheels, and they operate an open-hearth steel furnace, using direct metal for casting. In the evening the members embarked on a train and arrived at Krakow about midnight.

The next day, Sept. 13, the party left Krakow by motor-coach and arrived at the works of Wegierska Gorka, a large pipe foundry where pipes are cast vertically by the Ardelt method. Large commercial castings also are made in this foundry, of which the general manager is J. Buzek, who was vice-president of the committee of patronage of the congress and played a prominent part in seeing to the welfare of the members.

**Visitors See Boundary Line**

Sept. 14 was devoted to excursions in the Tatra mountains, the members being taken 7,000 feet up in an aerial ropeway to a region where the border line between Poland and Czechoslovakia runs. On Sept. 15 the congress party left Zakopane and reached the river Dunajec in the Pieniny mountains. The descent on the river was made on rafts constructed of three or four hollow tree trunks fastened together with raffia, and exciting moments were experienced when shooting some fifteen rapids. At night the members of the congress re-assembled at Krakow, the historic capital of Poland, now superseded by Warsaw.

On Friday, Sept. 16, a visit was made in the afternoon to the famous salt mines of Wieliczka, where wonderful chapels and carvings have been made out of the salt walls by naturally gifted salt miners, past and present.

On the last day, Saturday, Sept. 17, the closing meeting of the congress took place at the Academy of Mines. Three papers were presented, including a review of the foundry industry of Poland by Prof. Buzek. The closing speeches were made by Prof. Gierdziejewski, Dr. Paul Schwietzke, and the minister of industry and commerce.

After the meeting, a wreath was placed on the tomb of Marshal Pilsudski, at the cathedral where are entombed the past kings of Poland, close to the historic castle of Wavel. In the afternoon the visitors were received at a garden party offered by the president (mayor) of Krakow, and the closing banquet was held in the evening in an atmosphere of genuine friendship. The opportunity was taken to express the very warm thanks of the congress to Prof. Gierdziejewski and his colleagues for their strenuous efforts in making the congress a success.

The 36 papers contributed to the meeting were presented in groups, with a few miscellaneous subjects interspersed, and the following review is given in the order in which the papers were presented.

Dr. Ing. H. Jungbluth, Fried. Krupp, G.m.b.H., Essen, Germany, presented the German exchange paper: "Co-operation Between the Constructional Engineer, the Foundryman and the Machine Shop Operator," in which he states that this co-operation covers the proper choice of material and the design of a casting, which enables sound castings to be produced, capable of being dealt with in the machine shop.

Dr. Ing. H. Resow, Magdeburg, Germany, contributed a paper entitled "The Influence of Material, Shape and Molding Practice on the Capacity of Production of a Steel Foundry," which was followed by a paper on "Co-operation Between the Constructional Engineer and the Foundryman in the Production of Nonferrous Castings," by Dr. Willi Claus, Berlin. The session ended with the presentation of a paper by V. C. Faulkner, editor, *Foundry Trade Journal*, London: "Some Notes on the Structure of the Foundry Industry of the United Kingdom," in which the author reviews the profound modifications that have been made in both organization and equipment of the foundry industry of the United Kingdom since the time of the paper which he presented at the Chicago convention in 1931.

**Describes Manufacture of Enamel**

Exchange paper of the Institute of British Foundrymen was by B. B. Kent, Sterling Manufacturing Co., London, entitled "The Preparation and Milling of Sheet Iron and Cast Iron Enamels." In the discussion Prof. Portevin drew attention to the question of the expansion of enamels in relation to the expansion of castings, and Prof. G. Welter referred to the influence on enamel of the ageing of a casting and to the effects of high temperatures.

Another British contribution followed: "The Nickel Cast Irons," by Dr. A. B. Everest, Mond Nickel Co., Ltd., London. The author stated that nickel is a graphitizer, breaking down the combined carbon as in white iron to give castings in the completely gray condition and lowers the critical temperatures in the metal so that, as in the case of steels, progressive additions render the matrix of the iron successively sorbitic, martensitic, and finally austenitic, with the development of important special properties in the

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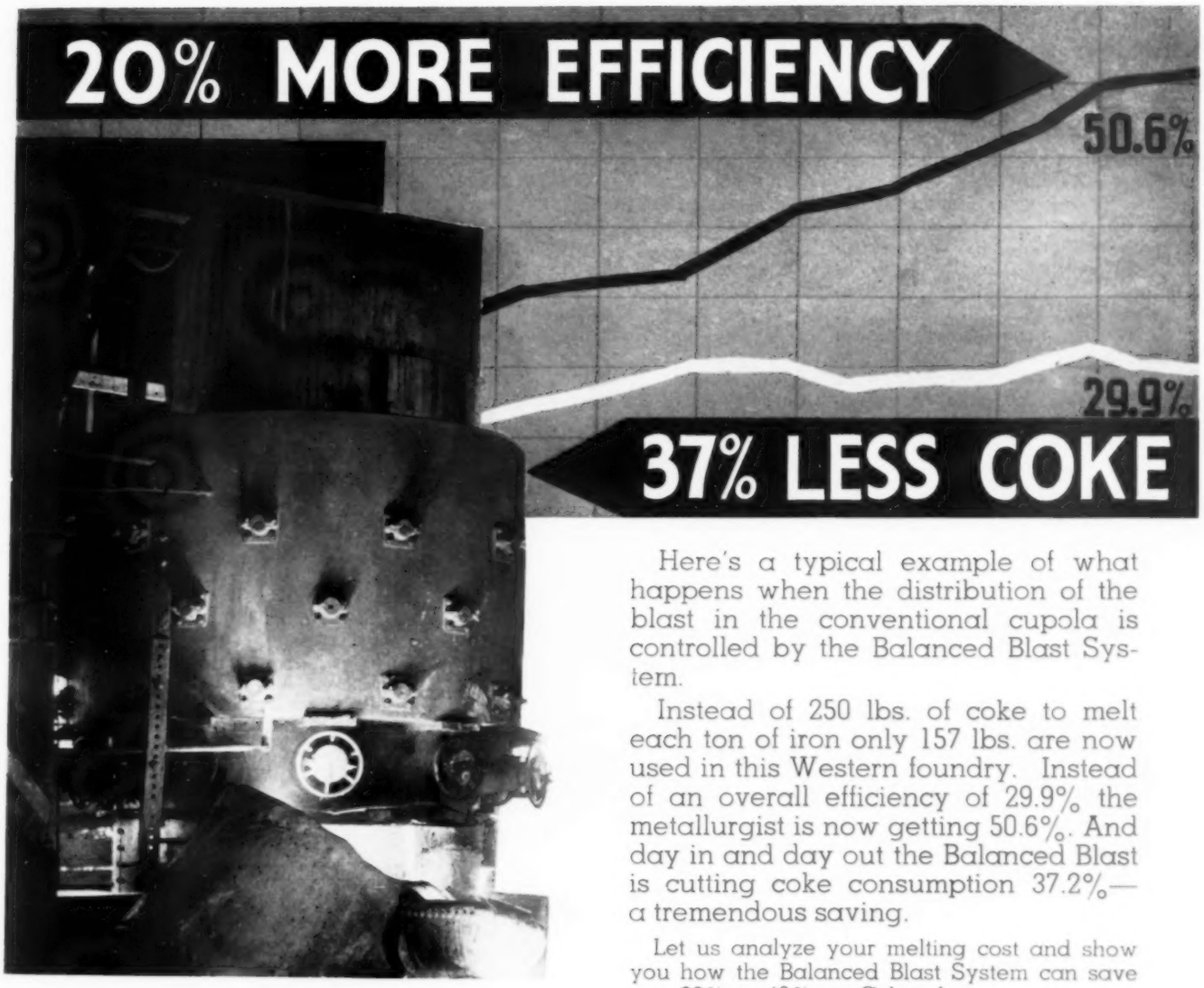


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castings. Prof. Portevin, referring to a table in the paper, said that he was glad to see that the author used terms belonging to metallography. Use of such terms brings clarity and method to the study of the subject.

Prof. H. Thyssen, University of Liege, Belgium, presented the exchange paper on behalf of the Association Technique de Fonderie of Belgium, the title being "Contribution to the Study of Chromium Cast Irons." The author's investigation covered alloys of iron, carbon and chromium, on which a number of experiments were made, with numerical results on castability, the structure of the iron, anomalies of expansion, mechanical properties, resistance to corrosion by air at 950 degrees Cent., the effects of silica, lime, and of sulphuric atmospheres. The paper also describes the influence of heat-treatment on the properties of the alloys investigated.

Prof. Portevin emphasized the importance of Prof. Thyssen's investigation and pointed out that in his work the author had combined scientific methods with technical results, such as taking into account the problem of castability, or that of corrosion under practical conditions. The speaker pointed out that the paper tends to show that there is a relation between practical characteristics and the constitution of the alloy.

### Study Several Types of Iron

"The Isothermic Treatment of Gray Cast Iron" was the subject of a paper presented by Ing. S. Pilarski and Ing. L. Szenderowski, Institute of Metallurgy and Metallography, Warsaw. For their researches, six types of gray iron were studied, and test-pieces were submitted to isothermic treatment in a salt bath at temperatures ranging from 250 to 700 degrees, and then cooled in water. It was found that the mechanical properties of the iron were improved. It is suggested that such a treatment should find considerable application in practice, especially as regards castings with thin sections.

Prof. Portevin pointed out that the paper showed that studies made from a scientific angle have practical results. He referred to the problem of deformations in castings submitted to the treatment, particularly as regards steel, and it would appear that this treatment, made in two stages, does not seem to improve results very much in regard to such deformations. He expressed the opinion, however, that a treatment such as the one described might reduce the tendency to contraction cracks. He emphasized the necessity of taking advantage of the results of investigations made on steel in regard to the study of cast iron, with particular reference to problems of heat-treatment.

Exchange paper of the Association Technique de Fonderie of France was an important contribution by Prof. Albert Portevin, director, Ecole Superieure de Fonderie, on "The Refining of the Structure of Castings," the paper being a general review of the stage reached in the study of this question at the present time. The author states that the art of the founder must realize three conditions: (1) The casting should conform to the pattern; (2) the casting should be compact, sound—i.e. exempt from macrographical and micrographical defects, and (3) the structure should be fine, to obtain the maximum specific strength and eventually to lend itself to heat treatment. He said that fineness of structure should be obtained during solidification of the casting and then enumerated the principal factors that can act on the speed of solidification of structure.

### Refine Cast Iron Structure

Prof. G. Welter, Institute of Metallurgy and Metalography, Warsaw, pointed out that there exists considerable literature on the subject of the paper, but that the paper classifies and summarizes the whole question in a remarkable manner. The author was asked which casting defects appear to be the most important and the most worth while to study, and Prof. Portevin said that physical defects were probably the most important, particularly the smaller ones, such as interdendritic cracks, these being very important because of their acuteness. Another speaker pointed out that for the past four years Polish research workers have been endeavoring to follow American lines of investigation on the refining of the structure of castings.

A paper by Dr. Franz Roll, Fa. Meier & Weichelt, Leipzig, Germany, was entitled "Limitations and Mistakes in Connection With the Image Seen In the Microscope." This was followed by a paper by Prof. F. Girardet, Nancy, France, past-president, Association Technique de Fonderie of France, the title being: "The Application of Electrolysis to the Microscopic Metallography of Gray Cast Iron" which describes an electro-chemical method of examination enabling certain measureable results to be obtained in the microscopic examination of castings.

Prof. Dr. Ing. I. Feszczenko-Czopiwski and Dr. L. Kozlowski, Research Institute of Huta Baildon-Katowice, presented a contribution on "The Influence of Titanium and Molybdenum on the Magnetic Properties of Iron Nickel-Aluminum Alloys." This was followed by a contribution entitled "The Crystallization of Iron and Its Alloys, and the Method of Its Investigation," by Dr. Ing. M. Smiatowski and J. Jastrzebska, Institute of Metallurgy and Metallography, Warsaw.

Prof. Dr. Ing. G. Welter and A. Bukalski, Institute of Metallurgy and Metallography, Warsaw, presented a paper on "The Static and Dynamic Investigation of Cast and Wrought Alloys Under the Influence of Tensile and Torsional Stresses." A method is described which permits static and dynamic tensile tests to be made simultaneously with torsion tests on such cast and wrought materials as gray iron, the alloy Al-85, Cu-3, Zn-12, and certain carbon steels.

"The Causes of Internal Weakness in Castings" was the title of a paper by Ing. J. Obrebski, Ostrowiec works, Poland. The author mentioned interdendritic cracks, nonmetallic inclusions, blowholes caused by the escape of gases, and stated that once the causes of internal weakness are understood, it should be possible to obtain an improvement in foundry technique which should tend to reduce those weaknesses.

### Coke Size Is Important

In another session, a paper was given on "Loss in Weight of Pig Iron Constituents As Affected By Coke Size," the authors being Prof. Ing. G. Buzek and Dr. Ing. M. Czyzewski, Krakow Academy of Mines. This was followed by the exchange paper contributed by the National Fascist Federation of Mechanical and Metallurgical Engineers: "Relation Between Certain Variables in Cupola Practice," by Dr. Ing. M. Barigozzi. This paper embodies the results of an inquiry made on certain cupolas in Italy. A number of formulas based on the variations of certain factors, such as the blast, the section of the cupola, the quantity of coke in the burden, etc., were worked out, and also some diagrams, and, according to the author's conclusions, these diagrams can be used to solve cupola problems and also to judge of the working of the cupola.

Another paper on cupola practice was the exchange paper contributed by the Hungarian foundry association on "Phenomena Occurring In Cupola Melting Practice," by Dr. Ing. A. Mahoczky and Ing. B. Vecsey, Budapest. This was followed by a contribution entitled "The Advantage of Blast Superheating In the Cupola," by Prof. Dr. Ing. R. Dawidowski, Academy of Mines, Krakow.

Ing. M. Olivo, Milan, presented a paper on "A New Method of Cupola Melting, Allowing the Adjustment of the Carbon Content In Cast Iron." The method described by the author is based (1) on the special construction of the cupola permit

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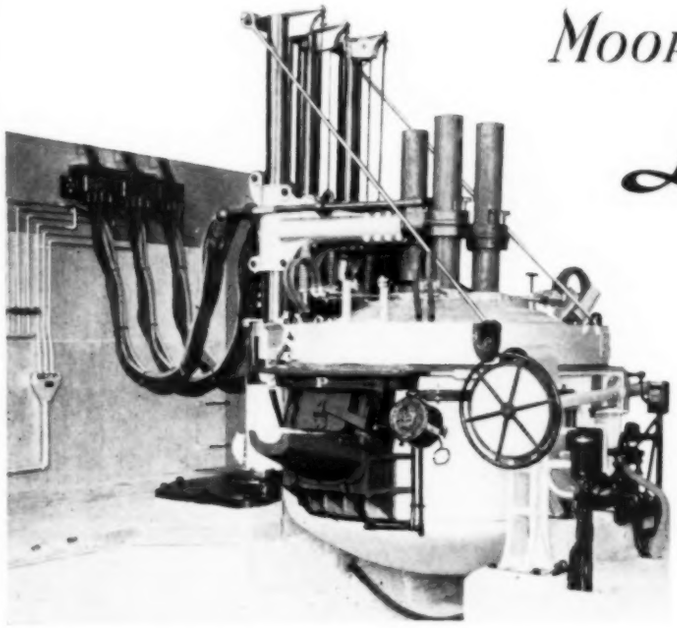

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ting various melting zones at variable heights; (2) the introduction of cold or hot blast at a volume and a pressure that are variable and inde pendent in the different zones; (3) the free control of the temperature of the blast introduced in the various zones. The author claims to obtain irons with a controlled carbon content, including an iron with about 2 per cent carbon. Last paper on cupola practice was by Ing. R. Suchanek, Krakow, entitled: "The Carbonizing of Steel In the Cupola As Affected By the Quality of the Coke."

One group of papers, given on the morning of Saturday, Sept. 10, dealt with alloy castings. The first paper, by Prof. Dr. J. Czochralski and Ing. K. Migurska, Institute of Metallurgy and Metallography and Research Laboratories of the Ursus works, Warsaw, was entitled: "Comparison of Various Methods of Refining Aluminum Alloys." Experimental research was made on an aluminum alloy containing 6.85 per cent copper, 0.33 per cent iron and 0.59 per cent silicon. Various methods of refining were applied, and it was found that the best results were obtained by using an active gas and also by using protective fluxes.

### Casting Magnesium Alloys

W. C. Devereux, High Duty Alloys, Ltd., Slough, Buckinghamshire, England, presented a paper on "Magnesium Foundry Practice," in which the practice used in the author's foundry in connection with casting of certain magnesium alloys is described. This paper was followed by a contribution on "Improvement of Aluminum and Magnesium Alloys by the Addition of Beryllium and Titanium," by Gaston Gauthier, Compagnie Alais Froges et Camargue, Chambery, France. The author indicated that to avoid the oxidizing effect of aluminum and magnesium alloys containing as much as 12 per cent magnesium, small additions of beryllium are made, and up to 0.02 per cent of titanium is also added to counteract the tendency of beryllium to increase grain size.

Prof. Dr. Ing. G. Welter and Ing. I. Mikolajczyk, Institute of Metallurgy and Metallography, Warsaw, gave a paper on "Compactness of Metals and Alloys Under High Pressure In Relation to the Pouring Conditions," and Prof. Dr. Ing. G. Welter and Ing. Z. Bukowski, presented a contribution entitled: "The Influence of Heat-Treatment on the Mechanical Properties of Certain Cast Aluminum Alloys." Two alloys were investigated: (1) RR-53, containing 2.12 per cent copper, 1.07 per cent iron, 1.18 per cent silicon, 1.27 per cent nickel, 1.34 per cent magnesium, 0.09 per cent titanium; (2) Y, containing 3.98 per cent copper, 0.54 per cent iron, 0.31 per cent silicon, 1.85 per cent nickel, 1.07 per cent magnesium, 0.08 per cent zinc.

The last paper of the group was by Ing. W. Gurycki, Ursus works, Warsaw, on "The Effect of Fluxes on Aluminum Bronzes." The author conducted investigations in which he studied the influence of phosphorus, manganese, silicon, magnesium, titanium, calcium and vanadium on aluminum bronzes containing 10 per cent aluminum and 1 per cent nickel, forged. In his conclusions, the author states that the best deoxidizing element is silicon in the form of cuprosilicon. Phosphorus can be employed up to 0.05 per cent.

### Discuss Foundry Sands

In another session on Saturday morning, three papers dealt with the subject of foundry sands, the first one being the exchange paper of the American Foundrymen's association, by G. K. Eggleston, Detroit Lubricator Co., and chairman, American Foundrymen's association nonferrous division committee on sand control, entitled: "Sand Control In the Nonferrous Foundry." In this paper the author presents some fundamental considerations of sand control for nonferrous foundries. He first traces the geological history of molding sands, showing how deposits were formed. Grain distribution is thoroughly discussed, and an explanation is given of the system of designating different grain sizes. The effect of grain size on permeability is explained. The clay content of a sand is considered important, and the various properties of clays are presented. Benefits of sand control and the essentials of sand control are listed and discussed. Finally, the author describes control as practiced in his plant.

The second paper on molding sands was: "Study of the Compression and Shearing Strength of Molding Sands," by Prof. Ing. B. Holman, Czechoslovakia. The author experimented on 14 different sands of Czechoslovak origin and obtained relations between compression tests and shearing tests, giving two equations: (1) The resistance to shearing in the green state is equal to the resistance to compression in the green state times 0.36, the result being in kilograms per square centimeter and (2) the resistance to shearing of dried samples equals the resistance of shearing to compression of dried samples times 0.28.

Prof. K. Gierdziejewski's contribution on the subject was: "Influence of the Moisture Content of Molding Sands on the Strength Properties of Cast Aluminum Test-Bars." The experiments showed that for aluminum test-bars there is a relation between the moisture content of the mold and the mechanical properties of the cast test-bar. It was found that influence of mold permeability on mechanical properties within the limits of normal permeabilities is not great. Further experimental work is required to arrive at the final solution of the above question.

In the discussion that followed it was pointed out, with particular reference to the paper by G. K. Eggleston, that sand control is not only advisable, but in many cases essential, since, as shown by Prof. Gierdziejewski, the moisture of a sand has an influence on the mechanical properties of a casting. It was also interesting to note that the subject of molding sand and its control had been treated by authors in three different countries — Czechoslovakia, Poland, and the United States.

Exchange paper of the Czecho-Slovak Foundry Technical association was presented by Ing. L. Olsansky, Brno, the title being: "Contribution to the Study of Corrosion in Iron and Steel Tubes With Reference to Stray Electric Currents." Following certain experiments, it was found that under similar conditions electrolytic corrosion takes place quicker in cast iron tubes than in steel tubes.

Dr. R. Smoluchowski, Institute of Metallurgy and Metallography, Warsaw, presented a paper on "A Modern X-Ray Study of Castings." This was followed by the paper entitled "Ostrava Foundry Coke for Cupolas," by Ing. V. Samuel, Brno, Czecho-Slovakia, in which he reviews the properties of coke used in the Moravska Ostrava district of Czecho-Slovakia, near the Polish border, which coke is manufactured at the Karolina coke ovens.

On the last day of the congress in Krakow, three papers were given before the closing ceremony, one being by Prof. Dr. Ing. A. Krupkowski, Dr. Ing. M. Czyzewski and M. Olszewski, Academy of Mines, Krakow, the subject being: "New Investigation Method of the Reactivity of Coke by Means of Metal Oxides." This was followed by a paper on "The Melting of Cast Iron Turnings In the Cupola," by Dr. Ing. M. Czyzewski, and the last paper was by Prof. Ing. G. Buzek, general director, Wegierska Gorka company, in which the author reviews the conditions of the foundry industry of Poland.

## Combine Offices

Offices of the Iron and Steel institute and of the Institute of Metals, London, England, have been moved to 4, Grosvenor gardens, London, S.W.1. Although the institutes will occupy separate offices, they will share committee and reading rooms. The libraries of the two institutes have been joined.

# Among Detroit Foundries

(*Concluded from page* 29)

work of monorails over the molds, ranged in rows on the plant floor.

The popular conception of how sashweight molds are prepared is that a wooden-legged veteran stomps over some packed sand and thrusts his peg leg therein at regular intervals. A much more practicable process has been developed. The weights are cast horizontally in 3-foot square steel boxes, 120 to a box. Cavities are formed by placing a row of 12 steel tubes, tapered at one end and open at the outer end, along each side of a center plate drilled to receive the ends of the tubes. With these 24 tubes in place, a high-bond sand is rammed around them and another layer of tubes placed in position. This is repeated until five layers of tubes have been built up, after which the top is smoothed off, and the tubes and center plate removed. Then into the end of each of the 120 holes left in the mold is inserted a baked sand core which is shaped so as to fit snugly into the hole and also to form the hole in the ends of the weight by which it is hung. Also on the core is a number which is transferred to the casting so that its weight will be marked plainly.

### Weights Made in Various Sizes

When the mold is poured and the iron cools a little, a hoist removes the box, after which the *Christmas tree* casting can be lifted out of the sand. A workman with a light sledge knocks the weights off the central gate and they are run through a tumbling cylinder and placed in storage.

Weights are made in a half dozen sizes, all to standard specifications, and range in diameter from 1½ to 2¼ inches and from 8 to 12 inches in length. They weigh from 4 pounds up to about 10 or 12, with the 5-pound size constituting the bulk. Thus a typical mold would include about 300 pounds of usable castings and 40 or 50 pounds of gates which are broken up and returned to the cupola.

Because of the severe service to which it is subjected, the cupola lining must be replaced after about 30 heats. At present, a firestone lining is used. It can be installed by two men in about a day and a half.

Naturally enough, the shipping cost involved in the sale of sashweights is a major expense. For example, a carload — 20 tons — is made up of three layers of weights over the floor of a freight car. Thus it has proved more practicable for manufacturers of these weights to operate several small plants throughout the country, rather than to concentrate in a single locality. Nevertheless the J & J plant in Detroit cast over 3000 tons of metal during 1937 which was not an exceptional year as far as building construction is concerned.

About 95 per cent of all sashweights in use are cast iron, although some lead weights occasionally are specified. Naturally the cost of lead weights is several times that of iron, and usually it is only where a building architect makes a mistake and forgets to allow sufficient space for weights that resort must be made to lead.

### Capacity Moving Upward

Automotive foundries gradually are moving up to capacity operations and the outlook is for a continuation of this pace over most of the remainder of this year. The Packard foundry, for example, is pouring about 145 tons daily, with one-shift capacity 175 tons.

Packard operates two 15-ton cupolas, one on hard and one on soft gray iron. Depending upon the nature of the casting, metal from one or the other of these sources is used. Some cases call for a mixture of the two irons. The hard iron charge is 35 per cent pig iron, 35 per cent steel and the remainder miscellaneous scrap including returns, etc. Steel is charged in the form of briquets about 5 inches in diameter and 3 inches thick, prepared from borings, turnings and the like from machine operations in the plant.

As in nearly all automotive foundries, at least in those making cylinder blocks, one of the chief concerns of Packard foundry technicians is the proper balance between bore hardness and machinability in block castings. Blocks are cast from the so-called hard iron. To increase bore hardness the castings are shaken out of molds while still red hot to promote more rapid cooling. The blocks are moved up an incline after they are shaken out and are conveyed on hooks about 400 feet through an overhead covered bridge to the machining department.

An unusual situation arose in this cylinder block casting work, as a result of half-hour shutdowns at noon and again at 5 p. m. At these hours there are still about 30 blocks which have been cast but cannot be removed from the molds because of the plant shutdown. Slow cooling of these blocks means that they will be softer when reaching the machining department, at the start of operations in the afternoon and the first thing in the morning.

To overcome this trouble, the cupola operator now gages the proper time when iron for these last 30 blocks is being tapped from the cupola and adds a carefully measured amount of steel to the ladle, so that a harder iron will be available for these slow-cooled castings. Net result is that a fairly uniform hardness is obtained in all blocks, regardless of when cast.

One reason for the precautions taken to avoid overhard blocks is attributable to the widespread adaptation of broaching instead of milling. Broaching of course is many times faster than milling and is ideally suited to automotive production. Approximately 8 hours are required to set up broaching tools for cylinder block operations. A single hard block in the broaching line can ruin a set of broaching tools in a few seconds. In milling operations a new milling cutter can be set in place in a few minutes. The problem is quite different when broaching tools must be replaced. The same situation also applies to honing operations when compared with the former method of reaming cylinder bores.

### Switch to Pearlitic Malleable

Recently Packard has made a switch to pearlitic malleable iron for camshafts in place of forged steel which in 1938 models had replaced cast shafts made by Campbell-Wyant & Cannon. This marks one of the first adaptations of pearlitic malleable iron in camshafts, although some experiments have been made with crankshafts of this material. The camshafts are hardened in the Tocco induction hardening equipment installed for heat treating the forged steel shafts.

An innovation in barrel and crankcase cores has been worked out by Packard engineers and has resulted in an appreciable cost saving. These cores are made in sections, two cylinder barrels per core. Formerly it was the practice to insert a perforated steel tube exactly in the center of the barrel core to provide the necessary rigidity as well as venting. These tubes could not be reused when they became filled up with iron. Now, an ordinary U-shape bar of steel is used to support the barrel and the center hole is left open for venting. The bar must be spotted accurately and the box indexed precisely on the core-blowing machine, an arbor moving up to form the center hole, while the two ends of the inserted bar pass up through the sand on either side of the center hole. There is little deterioration of these bars and their cost is well below that of the perforated steel tubes.

# OBITUARY

CHARLES H. GALE, 81, widely known in foundry circles died Sept. 26 at the home of his son Gustav W. Gale, Grand Rapids, Mich. Mr. Gale was born in Detroit and entered the plant of the Michigan Stove Co., as an apprentice molder in 1874. He remained with this company for 8 years with the exception of a period of 15 months spent in various European foundries. Later he became connected with the Michigan Malleable Iron Co., for a period of 16 years first as a molder and then in succession time keeper, order clerk, foreman and superintendent. For the next 5 years he was superintendent of gray iron and malleable foundries International Harvester Co., Springfield, O. From 1905 to 1922 he was superintendent of foundries Pressed Steel Car Co., Pittsburgh. In the latter year he retired from active service and devoted most of his time to an extensive traveling program to nearly all parts of the world. He was one of the earliest members of the American Foundrymen's association and continued his membership and active interest throughout his life. As a mark of recognition he was elected to life membership in the association at a meeting of the board of directors following the 1932 convention, being the first to be so honored by the association.

* * *

Donald E. Jones, general manager, Crown Pipe & Foundry Co., Jackson, O., died on Sept. 15.

* * *

George Murdoch Sibley, 77,, former president of the Denver Iron Works & Foundry Co., Denver, died at his home in Denver Sept. 20.

* * *

William Robb Barclay, 62, died in Birmingham, England, Sept. 16. An authority on nonferrous metallurgy, Mr. Barclay was best known for his contribution to the development of the nickel industry.

* * *

Harry H. Ward, age 53, foundry foreman for the Long Beach Iron Works, Long Beach, Calif., for the past 8 years, and prior to that foundry foreman for the Baker Iron Works, Los Angeles, died recently.

* * *

Col. Charles Arthur Carlisle, 74, died recently in Indianapolis. He was a director of South Bend Malleable Iron Co., South Bend, Ind., and a former president of the National Association of Manufacturers.

* * *

Clarence Colvin, associated with his brother, Charles T., in the ownership and operation of the Colvin Foundry Co., Providence, R. I., died recently in that city. Mr. Colvin was a lifelong member of the New England Foundrymen's association.

* * *

C. H. Rohrbach, 62, died Sept. 7 in Rochester, Pa. He was secretary and director of several trade associations including the Crucible Manufacturers association, Hydraulic Institute, Special Refractories association, and the Pump Manufacturers association.

* * *

William E. Jeannot, 72, former president of the West Michigan Steel Foundry Co., and president of the Eagle Foundry & Machine Co., Muskegon, Mich., died Oct. 4, after a long illness. He was a director of the Hackley Union National bank and had been active in the Muskegon chamber of commerce.

* * *

Richard Kelly, 69, former president of R. Hoe & Co. Inc., New York, manufacturer of newspaper printing presses and other printing machinery, died Sept. 22 in that city. A native of Prescott, Ont., Mr. Kelly entered the employ of the company in 1885. He became president, general manager, and chairman of the board in 1920, and retired in 1925.

* * *

Thomas P. Agnew, 57, connected with the Bowler Foundry Co., Cleveland, in an executive capacity for the past 25 years, died in St. Vincent Charity hospital, Oct. 13 following an emergency appendicitis operation. He was born and educated in Cleveland where as a young man he learned the trade of patternmaker with the old Variety Iron Works. During the mayoralty regime of the late Newton D. Baker he became city castings inspector. In 1912 he joined the staff of the Bowler Foundry Co.

* * *

Dean Clifford B. Connelley, 75, died at his home in Pittsburgh Sept. 29. He was born at Monongahela City, Pa., March 26, 1863 and in his younger days as a patternmaker was active in the patternmaker's league. Becoming interested in industrial education he organized the work for the schools in Allegheny. Later he became attached to the Pittsburgh manual training schools, Western University of Pennsylvania and Carnegie Institute of Technology. For several years he served as commissioner of labor and industry of Pennsylvania with office at Harrisburg. He was elected a director of the A. F. A. in 1922. Dean Connelley was known as the father of vocational training in Pittsburgh, one of the city's outstanding educators and one of the three men selected by Andrew Carnegie to plan the building and grounds of Carnegie Institute, where later he served as dean of the school of industry.

## Adventures of Bill

(*Concluded from page* 49)

to describe the derivation of this word. For that matter, he added, he had no explanation for the terms usually employed by the white vendors of the same merchandise: Gadgets, hickeys, doodads, dinkies, dofunnies, hoot-nannies, diddlers and didos.

White inhabitants of the colony live principally in the sea coast towns, but several sizable settlements have been established in the interior. Many of the towns bear good old British names, Halifax, Sydney, New Glasgow and Truro, but others built on old Indian camp sites perpetuate the old Indian names Tatamagouche, Shubenacadie, Whycogamagh, Antigonish, Judique, Pugwash and Pictou.

In explaining the name MIC-MAC for the new vessel the captain stated that the majority of the people are descendants of Irish and Scottish emigrants "familiarly" referred to as the "Micks" and the "Macs". The name Mic-mac therefore is a s ignt-ly abbreviated combination of the two words.

"After reading this horribly distorted version of the interview the captain fortified himself with a large hooker of red Demarara rum and then with all sails set, bore down on the editor's office like the well known Assyrian who came down like a wolf on the fold and all that kind of stuff.

"He keel hauled the land lubberly swab in proper nautical language and finally calmed down sufficiently to explain the origin of the name Mic-mac. He admitted that the majority of the inhabitants of Nova Scotia were Irish and Scottish Micks and Macs, but that had nothing to do with the name of the ship. She was called after the name of an Indian tribe, the Mic-macs.

"The editor was profuse in his apologies and promised to run a revised and corrected version in the next day's edition. The correction was worse than the original.

We regret to state that a slight error appeared in an item yesterday dealing with the name of a new vessel built by Messrs. Tilliegorum & Co., Ltd., to the order of Messrs. J. W. Carmichael & Co., New Glasgow, Nova Scotia. The item stated that the vessel was named the MIC-MAC, a slightly abbreviated combination of the names "Micks" and "Macs" by which the Irish and Sottish settlers are known in this oversea colony. Through the courtesy of Captain Meikle, master of the MIC-MAC we now learn that the name refers to a tribe of wild Indians who are half Irish and half Scottish!

# 50 YEARS OF PROGRESS

GOLDEN ANNIVERSARY
1888 1938
DIAMOND CRUSHED STEEL
SAMSON STEEL SHOT
ANGULAR STEEL GRIT
PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PA.

## "CERTIFIED" STEEL ABRASIVES

"Results—not excuses" has been our policy for fifty years. It is also our pledge to users of steel abrasives for the future.

Foundries demand cleaning *results*. They *get them* with "Certified" Shot and Grit. For Air or Airless Blast Cleaning the use of "Certified" Steel Abrasives assures cleaner castings with less dust nuisance, lower cleaning cost as abrasive lasts longer and may be easily cleaned, and increased production of the kind of work customers like to buy.

Why not use our fifty years of abrasive experience to "iron out" your cleaning problems and increase your profit?

## PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PENNA.
## STEEL SHOT AND GRIT CO.
BOSTON, MASS.

## HAUSFELD
### STATIONARY MELTING FURNACES

*Keep Hand Ladling of Soft Metals in Step with Production Needs.*

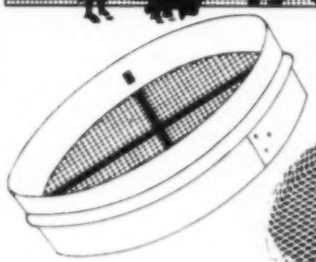
For nearly half a century Hausfeld Stationary Type Melting Furnaces have been standard equipment with leading foundries melting Aluminum, Zinc, Lead, Tin, and their Alloys. The unit illustrated here has cast iron pot and is available in a wide range of sizes. Furnaces of the same type are also made to accommodate standard crucibles. Fully equipped with Hausfeld Blowers and burners for natural or artificial gas or fuel oil these furnaces assure accurate analysis alloys at lowest melting costs.

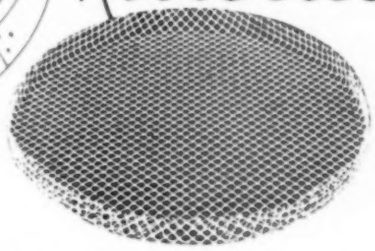
*Write for Catalog and Literature describing our new Multiple Burner Furnaces*

THE CAMPBELL-HAUSFELD COMPANY

300-320 Moore St., Harrison, Ohio

## BUFFALO Riddles





● "BUFFALO" riddles and riddle bottoms for gyratory machines are *good* because they have been designed and constructed especially for foundry use—they do *faster, cleaner work* and they *last longer*.

We can supply you with riddle bottoms in any grade, gauge, mesh or weave to suit your particular requirements. You are invited to send your specifications for price quotation without obligation. Ask, too, for new folder No. 91-B.

We can supply *wire goods to meet any requirement* you may have, in or out of your foundry.

*We are not connected with any other wire weaving company in New York State or any other part of the United States.*

## Buffalo WIRE WORKS Co., Inc.
425 Terrace, Buffalo, New York
*Branch Office & Warehouse:* 11 South 7th St., Philadelphia, Pa.

# FOUNDRY ACTIVITIES

UTILITY Electric Steel Foundry division, Utility Trailer Mfg. Co. Los Angeles, placed in operation on Nov. 1, a high frequency induction furnace on the Pacific coast for production of alloy steel castings. The firm specializes in alloy steels for refinery and aircraft castings, and also produces heat and corrosion resistant castings. An addition to the foundry has added 6000 square feet of floor space. Special foundry equipment has been installed to supplement the new furnace which will make the alloy department an independently contained unit. Expenditure for the complete program will exceed $50,000. Officers of the firm are E. W. Bennett, president; G. L. Knox, vice president; H. C. Bennett, secretary-treasurer, and E. C. Hummel, general manager.

* * *

K. R. Wilson Foundry, Arcade, N. Y., will start production of a new type of gas heater immediately according to K. R. Wilson, president.

* * *

Name of the Monarch Aluminum Ware Co., 9301 Detroit avenue, Cleveland, has been changed to the Monarch Aluminum Mfg. Co.

* * *

Griffin Wheel Co., St. Paul, car wheel manufacturer, has begun construction of one story, 50 x 152-foot factory addition.

* * *

Draper Corp., Hopedale, Mass., manufacturer of textile machinery, is constructing two one-story additions to its plant, one 30 x 520 feet for foundry purposes, and the other 30 x 130 feet for storage and distribution.

* * *

Security Stove & Mfg. Co., 1630 Oakland street, Kansas City, has begun work on two-story factory addition, 86 x 125 feet, which will cost approximately $40,000.

* * *

Bohn Aluminum & Brass Co., Detroit, has awarded general contract for constructing and equipping one-story furnace room, costing $40,000, to Krieghoff Co., 6661 French Road, Detroit.

* * *

General Metals Corp., Los Angeles, Calif., has let contract to W. A. Brunet, Shell building, Houston, Texas, for constructing $125,000 factory to manufacture oil industry castings in Houston. Work on the project is to begin within 10 days.

* * *

Standard Brake Shoe & Foundry Co., St. Louis, announces that it will install a steel foundry at Memphis, Tenn., to make castings for locomotives and railroad cars, and equipment for industrial plants.

* * *

Walnut Hill Foundry Co., Wabash, Ind., suffered complete loss of its foundry and shop on Sept. 11, but has secured a long time lease on the property of the old Wabash Foundry Co. in that city. New quarters of the firm are larger than the old, and the firm intends to expand its field.

* * *

Index of foundry equipment orders for September, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 78.7 as compared with 83.3 in August and 231.8 in September, 1937. Index of shipments was 84.2 as compared with 89.1 in August and 235.4 in September, 1937.

* * *

Roberts Brass Co., Milwaukee, maker of castings and distributor of brass and bronze supplies, recently acquired by the American Brass Co., division of the Anaconda Copper Co., has changed its corporate title to Lincoln Co., remaining a Wisconsin corporation. James S. Parnell continues as secretary.

* * *

Bids for the structural steel framework for a foundry building at Mare Island navy yard, San Francisco, recently were opened. The building is to be 180 feet wide and 408 feet long. It is understood that the foundry first will be equipped for the production of gray iron castings but that it is anticipated that steel castings will be produced later. Ben Morrell is chief of the bureau of yards and docks, Navy department, Washington.

* * *

Production of castings during August in gray iron and steel foundries in the Third Federal Reserve district increased considerably over production in July according to reports received by the Industrial Research department, University of Pennsylvania. Gray iron output rose over 35 per cent with increases in all parts of the district in both jobbing work and the output of castings for further use within the plants. Increase in steel production was nearly 55 per cent, and both types of castings contributed to the rise. Shipments of gray iron castings rose about 7 per cent and of steel castings slightly over 41 per cent. Backlog of unfilled orders increased over 13 per cent in iron foundries but declined over 5 per cent in steel foundries. Stocks of pig iron were smaller and stocks of coke were larger in both iron and steel foundries than at the end of July. Iron foundries had more scrap on hand and the steel foundries had less.

**RAW MATERIAL PRICES**
**Oct. 24, 1938**

| | | |
|---|---|---|
| **Iron** | | |
| No. 2 foundry, Valley | | $21.00 |
| No. 2 Southern Birmingham | | 17.00 |
| No. 2 foundry, Chicago | | 21.00 |
| No. 2 foundry, Buffalo | | 21.00 |
| Basic, Buffalo | | 20.00 |
| Basic, Valley | | 20.50 |
| Malleable, Chicago | | 21.00 |
| Malleable, Buffalo | | 21.50 |
| Charcoal iron, furnace | | 25.00 |
| **Coke** | | |
| Connellsville beehive premium | $5.75 to | $6.25 |
| Wise county beehive coke | 5.50 to | 6.50 |
| Detroit by-product delivered | | 10.25 |
| **Scrap** | | |
| Heavy melting steel, Valley, No. 2 | $12.50 to | $13.00 |
| Heavy melting steel, Pittsburgh, No. 2 | 13.25 to | 13.75 |
| Heavy melting steel, Chicago, Auto No. 2 | 10.00 to | 10.50 |
| Stove plate, Buffalo | 13.00 to | 13.50 |
| Stove plate, Chicago | 7.50 to | 8.00 |
| No. 1 cast, mchy. New York | 12.00 to | 12.50 |
| No. 1 cast, mchy., Chicago | 11.75 to | 12.25 |
| No. 1 cast, Pittsburgh | 15.00 to | 15.50 |
| No. 1 cast, Philadelphia | 16.50 to | 17.00 |
| No. 1 cast, Birmingham | 14.00 to | 14.50 |
| Car wheels, iron, Pittsburgh | 14.50 to | 15.00 |
| Car wheels, iron, Chicago | 12.50 to | 13.00 |
| Railroad malleable, Chicago | 13.50 to | 14.00 |
| Malleable, Buffalo | 13.50 to | 14.00 |
| **Nonferrous Metals** | | |
| | | **Cents per pound** |
| Castings copper, refinery | | 10.77½ |
| Straits tin | | 45.95 |
| Aluminum, 99 per cent | | 20.00 |
| Aluminum, No. 12 (Secondary, standard) | 13.75 to | 14.25 |
| Lead, New York | | 5.10 |
| Antimony, New York | | 12.25 |
| Nickel, electro | | 35.00 |
| Zinc, East St. Louis, Ill. | | 5.05 |


**CHRISTMAS SEALS**

***Help to Protect Your Home from Tuberculosis***

## Stover Mfg. & Engine Co.

# STANDARDIZES ON SILVERY MAYARI

## for soundness
## high strength
## heat dissipation

Stover Manufacturing & Engine Co., Freeport, Ill., uses Silvery Mayari exclusively in casting cylinder liners where absolute uniformity in hardness throughout the entire section is essential to keep the bore from wearing elliptical in service.

Uniform hardness is one outstanding result of including Silvery Mayari in the cupola mixture. Further benefits to be derived are ready machinability in both thick and thin sections and excellent heat-dissipating and abrasion-resisting qualities. Grain structure is absolutely uniform. Silvery Mayari castings, regardless of size, are free from spongy areas and blowholes. They are good sound iron throughout.

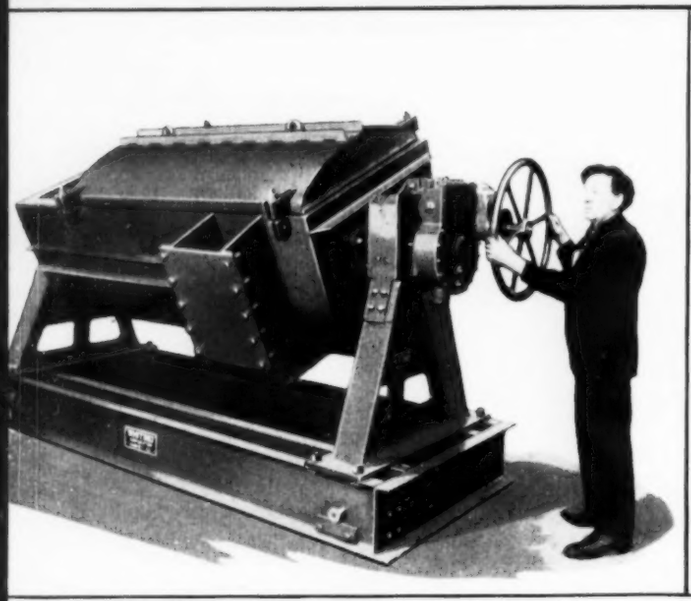
Since Silvery Mayari is a natural alloy iron, with an ideal balance of nickel and chromium, its use greatly simplifies cupola practice and permits the inclusion of a higher percentage of steel scrap. In addition, a number of different parts may be cast from the same mixture.

Foundrymen throughout the country have found that including Silvery Mayari in cupola mixtures is an excellent way of reducing spoilage and rejections and of economically producing castings which are uniformly high in quality. A talk with one of Bethlehem's foundry specialists will show you how readily Silvery Mayari can be used in your own business. Consulting them places you under no obligation and may save you worthwhile sums.

BETHLEHEM STEEL

**BETHLEHEM STEEL COMPANY**

# Save $2 Net Per Ton of Melt . . . by Desulphurizing in U-ladle



*Whiting U-ladle with E-Z Pour Tilting Mechanism, for continuous desulphurizing of cupola metal.*

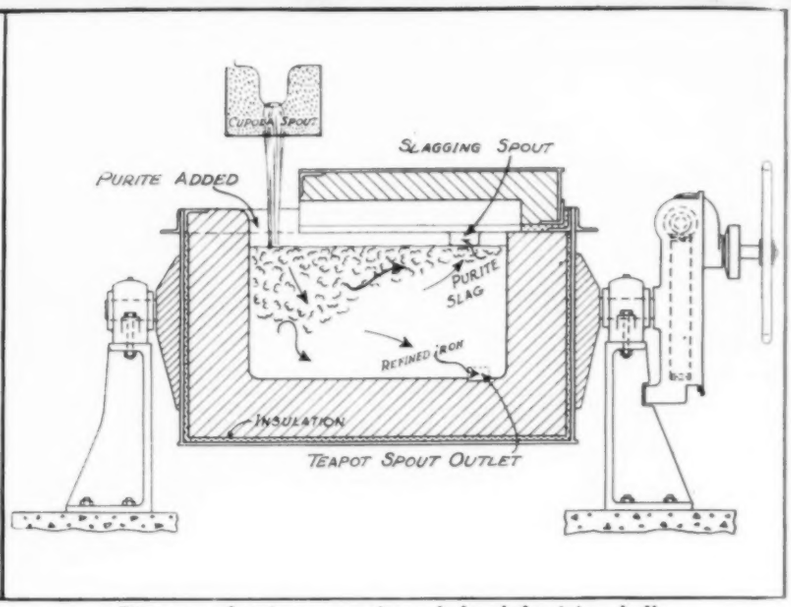



*Diagram showing operation of desulphurizing ladle.*

THERE is nothing you can put in your foundry that will pay for itself so quickly as a U-ladle. Operating data on numerous installations prove conclusively that the U-ladle pays for itself in one or two months by cutting the pig iron consumption in half. As the spread in cost between scrap and pig is usually $10 to $12 per ton, this makes a gross saving of $2.50 per ton of melt, and allowing for Purite and alloy additions, the net saving is at least $2.00 per ton. In a 25-ton per day shop this makes a saving of $50.00 per day, to say nothing of the improved quality of the metal.

## High-Quality Metal—Greater Uniformity

Ability to refine in the U-ladle permits the use of large portions of scrap in the charge and the control of analysis by additions of manganese or silicon briquettes, either in the cupola or in the ladle. Passing all the metal thru the U-ladle tends to "level off" the highs and lows in the scrap and accounts for the greater uniformity of U-ladle iron.

## 25% to 50% Sulphur Reduction

The contact of the molten cupola metal with the Purite slag as it passes thru the U-ladle removes from 25% to 50% of the sulphur, depending upon the temperature required for pouring.

## All These Benefits Now Available to Many

Because Whiting U-ladles are insulated and covered, the drop in temperature while passing thru is very small—usually from 50 to 100 F. For that reason many foundries can now enjoy the benefits of mixing and desulphurizing, whereas the old style reservoir ladles were limited to the heavy-casting shops. Today even piston ring foundries are using reservoir U-ladles to good advantage.

The list of progressive foundrymen who adopt the U-ladle is increasing rapidly. You, too, can save money and improve the quality of your castings by continuous desulphurizing.

*Price and specifications on request.*

WHITING CORPORATION
15607 Lathrop Avenue, Harvey, Illinois

***We Build for Foundries —***

Cupolas (Hot or Cold Blast)
Cupola Chargers
Cupola Blowers
Brackelsberg Rotating Furnaces
Cradle Furnaces
Air Furnaces
Annealing Ovens
Steel Converters
Duplexing Equipment
Ladles—All Types
Tumbling Mills
Dust Filters
Pulverized Coal Equipment
Seacoal Pulverizers
Stokers (for Core Ovens)
Electric Traveling Cranes

WHITING

PIONEERS SINCE 1884